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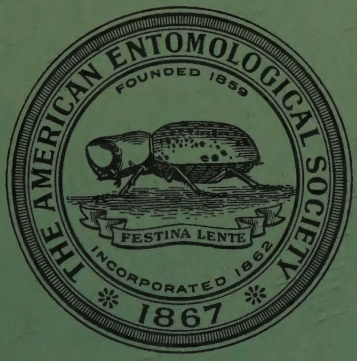

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A GENERIC REVIEW OF THE AMISEGINAE, A GROUP OF PHASMATID EGG PARASITES, AND NOTES ON THE ADELPHINAE

(HYMENOPTERA, BETHYLOIDEA, CHRYSIDIDAE)

R

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The complex of genera reviewed here constitutes one of the rarely collected and very poorly known groups of Hymenoptera. The component genera, many of them highly specialized forms, have not been placed together previously, some of them having been assigned to a variety of different, or even monotypic, families. Members of the complex have been described in, or transferred to, such diverse groups as the Chalcidoidea, Bethylidae, Cleptidae, Chrysididae, Myrmosinae of the Tiphiidae, and even in a separate family with no determinable affinities, the Alienidae (or Alieniscidae).

My interest in the group was aroused several years ago when E. S. Ross asked me, in connection with my studies on the wasps of New Guinea and the Solomon Islands, to examine a new "alienid" from New Guinea. Study of this species and of several other more or less closely related genera in the collections of the U. S. National Museum convinced me of the advisability of a generic reclassification of the group. This paper, then, presents a revised characterization of the subfamily Amiseginae, a key to the known genera, revised generic diagnoses, and descriptions of several new genera and species. Brief discussions are also presented on the taxonomic history of members of the subfamily, the known host relationships, zoogeography, and relationships with other groups. Some notes are presented also on a very closely related subfamily, the Adelphinae, since it may be established eventually that this group should be merged with the Amiseginae.

It is a pleasure to acknowledge my indebtedness to the following specialists who have assisted in this study as detailed opposite their names: Dr. George Arnold, former Director of the National Museum of Southern Rhodesia, for the loan of the unique type of *Alieniscus arnoldi* Benoit; Dr. William L. Brown, Jr., of the Museum of Comparative Zoology at Harvard College for the loan of the unique specimen of a new genus and species of Adelphinae described below; Dr. Kenneth W. Cooper, head of the Department of Biology at the University of Rochester for the donation of material of *Amisega* and *Adelphe* collected by him in Costa Rica; Dr. A. da Costa Lima of the Escola Nacional de Agronomia, Brasil, for the donation of a pair of paratypes of his *Duckeia cyanea;* Dr. H. E. Evans of Cornell University for the loan of several specimens of *Adelphe;* Dr. Delfa Guiglia of the Museo Civico di Storia Naturale at Genoa for making available the type of *Promesitius flavicollis* Kieffer; Mr. E. F. Riek of the Commonwealth Scientific and Industrial Research Organization at Canberra, Australia, for the donation of paratypes of some of the Australian species described by him, and for making available for study and description a specimen of a new genus and species of Amiseginae which he had borrowed from the Paris Museum; Dr. E. S. Ross of the California Academy of Sciences at San Francisco, for first stimulating my interest in this group by the loan of the new genus and species from New Guinea described below; Dr. H. K. Townes of North Carolina State College at Raleigh for the loan of material collected by him and his family in North Carolina and the Philippines; and Dr. I. H. H. Yarrow of the British Museum (Natural History) for searching out, at considerable expenditure of time, and loaning to me the African material studied by J. A. Reid, and for many valuable notes on the Cameron and Kieffer types in that Museum.

Historical Review

In considering the taxonomic history of this subfamily it will be more helpful to treat the three component series of genera separately, rather than to attempt to relate the history in strictly chronological order.

The taxonomic history of the relatively primitive, winged American Series has been rather untroubled. *Amisega* Cameron was considered by that author (1888) to belong to the Cleptinae in the Chrysididae. Mocsary (1889), in his monumental review of the Chrysididae, erected the subfamily Amiseginae for this single genus and placed it as the first subfamily followed by the Cleptinae. Ashmead (1902) followed Mocsary's classification but reversed the order of subfamilies so that the Amiseginae stood last (seventh), and added to it a new genus from North America, *Mesitiopterus*. Costa Lima (1936) described *Duckeia* and placed it near *Amisega*.

The assignment of the brachypterous and entirely wingless Old World genera has resulted in several considerably divergent viewpoints. I suppose that this has been due to several factors, including the modifications of thoracic structure occasioned by subaptery and aptery, the fact that the typically telescoped terminal abdominal segments are rarely exserted, and the non-availability of the primitive winged American genera to most of the workers who described the Old World genera.

The earliest described genus of the Australasian Series is *Myrmecopsis* Walker, 1866, (preoccupied by Newman), for which Dalla Torre proposed the substitute name, *Myrmecomimesis*. This genus was based on a brachypterous female which Walker erroneously supposed to be a male chalcidoid. *Promesitius*, a synonym of *Myrmecomimesis*, was described by Kieffer (1905) in the Bethylinae of the family Proctotrupidae. Later Kieffer (1914) assigned *Promesitius* to the tribe Mesitiini of the bethylid subfamily Bethylinae. This tribal arrangement, based on the acute posterolateral angles of the propodeum in the four component genera, grouped together a heterogeneous assemblage which are now recognized as belonging to the Rhopalosomatidae, Chrysididae and Bethylidae. Reid (1941, footnote on p. 409) suggested that *Promesitius* belonged in a highly aberrant subfamily of Chrysididae with several other undescribed African genera. On an earlier page (p. 407) Reid, in discussing *Promesitius*, makes the significant statement (italics mine), "The head is like that of a Chrysidid, *in particular of Amisega*, and

quite unlike that of a Bethylid; . . ." Riek (1955) described *Cresmophaga* and *Ootheres*, herein placed as synonyms of *Myrmecomimesis*, and *Exova* as Cleptidae. The Philippine *Cladobethylus* Kieffer, 1922, was assigned to the Bethylinae, although its author recognized that it was an anomalous member of that group. The Philippine *Rohweria* Fouts, 1925, was described in the Bethylidae because it ran to *Mesitius*, a true bethylid, in Kieffer's key (1914).

The genus which has caused the most confusion within the African Series is *Alienus* Bridwell, 1919 (preoccupied by Handlirsch), for which Strand proposed the substitute name, *Obenbergerella*. In describing *Alienus* from a single apterous individual of indeterminate sex, Bridwell was so uncertain of its affinities that he erected a new family for it, the Alienidae, which he believed fitted best in the Proctotrupoidea. He mentioned why it could not be associated with the Ceraphronidae, Bethylidae, Embolemidae, Dryinidae, Pompilidae, and other families of the Scolioidea, but apparently, at least in print, did not consider the possibility of assignment in the Chrysidoidea. Brues and Melander (1932) made a brilliant guess in their Conspectus (p. 25) in which they assigned the Alienidae to the Chrysidoidea along with the Cleptidae and Chrysididae. However, they are the innocent cause of one of the resulting erroneous assignments for this family. Working from Bridwell's original description alone, they keyed out the Alienidae in two places. Their couplet 15 (pp. 474-475), which separates the Terebrantia from the Aculeata, is based mainly on the type of ovipositor, and a secondary, but not exclusive, character is whether the trochanters are two-segmented. Since the type of ovipositor was unknown in the Alienidae, and Bridwell had characterized it (erroneously) as having two-segmented trochanters, Brues and Melander prudently keyed it out in both the Terebrantia and Aculeata. In the first group it keyed out among a number of families of Chalcidoidea, and in the latter it keyed out with various wingless Proctotrupoidea and Aculeata. This was quite a sensible provision except that in the index the only reference to Alienidae is to the page where it keys out in the Chalcidoidea. Inevitably, another worker was bound to overlook the assignment to

the Chrysidoidea in the Conspectus, to notice that the family was seemingly firmly assigned to the Chalcidoidea, and to ask himself just where it fitted in that superfamily. This action was taken by Essig (1942, p. 650) who assigned the group as the last family in the Chalcidoidea immediately preceding the Proctotrupoidea. Actually, the correct assignment of *Alienus* was not possible until specimens of the undescribed brachypterous species from New Guinea were placed in my hands, for Bridwell's unique type of *Alienus aenigmaticus,* due to breakage during shipment with other specimens from Hawaii to Washington, consisted of only a thorax glued to a point, plus a detached head and abdomen which might or might not belong with the thorax. Critical study and comparison of the almost wingless species from New Guinea with the wingless thorax of *Alienus aenigmaticus,* and its putative head and abdomen, convinced me that the two belong in the same subfamily though in discrete genera, and also that the detached head and abdomen are actually parts of Bridwell's type. More important still was the realization that the differences between these two genera and the winged American representatives assigned to the Amiseginae were of a very minor nature and related to the loss of wings in the former two genera. *Alienus* was apparently overlooked by Reid (1941) in his masterful work on the thorax of apterous and brachypterous Hymenoptera, but study of his work convinced me that the new subfamily of highly aberrant Chrysididae tentatively proposed by Reid (p. 409, footnote) actually consists of genera belonging to the same group as *Alienus.* This conclusion was borne out later, when material studied by Reid was made available to me.

The recently described African genus, *Alieniscus* Benoit, 1951, was assigned by that author to a separate family of the Aculeata along with *Obenbergerella* without further discussion of the affinities of the family. Benoit also proposed, as was his privilege, that the family should be known as the Alieniscidae in order to preserve the original consonance of the family name. Ghesquière (1951), after examining *Alieniscus,* placed it and *Obenbergerella* in the tiphiid subfamily Myrmosinae, as a new tribe to which he applied the name Obenbergerellini.

Distribution

The distribution of the Amiseginae is of a very curious discontinuous type, and the evidence is very striking in favor of its having had a southern origin. The group is represented by several genera and a few species in each of three main areas—tropical America north from Rio de Janeiro and east of the Andes, with an extension northward into the Austral and Transition Zones of North America, a narrow strip of South Africa from the Cape region to Southern Rhodesia, and from Australia, New Guinea, Philippines, Borneo, Burma and India. The American Series has three genera and nine described forms, the Australian Series comprises eight valid genera and twenty-four species, and the African Series includes three genera and four species. The Amiseginae are relatively small insects with retiring habits, and it seems probable that a few undescribed genera and a number of undescribed species still remain to be collected.

In connection with this distribution it is to be noted that the genera from the major areas each form separate series of rather closely related forms. Thus, the American genera are distinguished by having the eyes bare, except in *Mesitiopterus*, fully developed wings, a small postscutellum, the propodeal dorsum without dentate posterolateral angles, no suture anteriorly on mesopleural disk, and the tarsal claws with an erect inner tooth. In the Australasian Series the eyes are hairy, tegulae are present but the females except *Atopogyne* are brachypterous, the forewings being reduced to tiny pads and the hind wings apparently absent, the postscutellum is very large, the posterolateral angles of the propodeum are dentate, an oblique suture is present anteriorly on the mesopleural disk, and the tarsal claws have an erect inner tooth. The African genera have hairy eyes except *Obenbergerella*, are entirely wingless and lack tegulae, the postscutellum covers almost the entire apical part of the thoracic dorsum, the propodeum is not dentate, an oblique suture is present anteriorly on the mesopleural disk, and the tarsal claws are simple. The American forms are unquestionably the most primitive, and the South African the most highly derivative.

The Phasmatidae, some of which serve as hosts during the egg stage for certain, if not all, of the Amiseginae, exhibit a similar though somewhat broader distribution. Günther's latest work

(1953) on the systematic arrangement and zoogeography of these insects contains maps charting the distribution of most of the subfamilies. These maps show that the phasmatids also occur predominantly in the Southern Hemisphere. Their distribution is somewhat broader than that of the Amiseginae, for a few species occur in southern Japan, around the Mediterranean Basin, the Malagasy sub-region, New Zealand and the Solomons, and in Chile. It is possible, of course, that more thorough collecting of the microhymenopterous fauna may demonstrate the presence of Amiseginae in at least some of these areas.

Host Relationships

The few published rearing records indicate with some probability that all members of the Amiseginae are parasitic on the egg stage of Phasmatidae. However, the available rearing records and specimens of Amiseginae are so scanty, and the classification of the walking sticks is so chaotic, that it is not possible at this time to determine the extent to which the distribution of various amisegines is correlated with that of various groups of walking sticks.

The type series of *Duckeia cyanea* Costa Lima emerged in October from the eggs of the pseudophasmatine, *Prisopus ohrtmanni* (Licht.), laid in a row on a plant in the Horto Botanico, Rio de Janeiro. Costa Lima included a photograph of the row of 17 eggs, each containing one emergence hole of the parasitic wasp. Dr. Costa Lima advised me (*in litt.*) that in each case the parasite emerged through the operculum of the egg. The series of parasitized eggs was found in August, and no further rearing data were given.

Milliron (1950) reported rearing *Mesitiopterous kahlii* Ashm. from eggs of the common heteronemiine walking stick of North America, *Diapheromera femorata* Say. The parasitized eggs were collected, presumably on the ground, at Brainerd, Minnesota, in the summer of 1947 and the adult wasps emerged from June 11 to 20, 1948. Milliron noted that the wasps emerged through the operculum of the host egg without rupturing the egg shell. There is an unpublished rearing record from this same host in Wisconsin. Adult wasps emerged in January from parasitized eggs brought into the laboratory the preceding October.

Riek (1955) reported that in Australia specimens of *Myrmecomimesis coeruleus* (Kieff.), *M. nigripedicel* (Riek), *M. rubrifemur* (Riek), *M. bispinosa* (Riek) and *M. semiglabra* (Riek) had been reared from eggs of *Podacanthus wilkinsoni* Macl., and of *M. bispinosa* and *M. semiglabra* also from eggs of *Didymuria violescens* (Leach). Both of these podacanthine walking sticks feed on foliage of *Eucalyptus* and broadcast the eggs on the ground.

It seems rather unlikely that walking sticks, like *Anisomorpha buprestoides* (Stoll), which oviposit in the soil could serve as hosts of Amiseginae, since none of the latter are known to have fossorial legs.

Relationships of the Amiseginae to other Chrysididae

Within the Chrysididae, as delimited and defined by Mocsary (1889, 1890), there appear to be two main divisions, one in which the abdomen is convex beneath and the integument of the body relatively thin, the other in which the abdomen is concave beneath and the integument of the body very much thickened. These morphological characters are correlated with the host relationships of the two divisions, members of the first division being parasitic in the eggs of walking sticks or on sawfly prepupae within their cocoons, and members of the second division being almost entirely cleptoparasites of other wasps and bees. The thickened integument and capability of rolling into a ball by flexing the head and thorax against the concave abdominal venter serve members of the second division as protection from attack by adults of the host wasp or bee.

The first division is composed of three subfamilies, the Cleptinae, Amiseginae and Adelphinae. The members of the first subfamily, so far as known, are parasitic on the prepupal stage of sawflies in their cocoons. The described genera include *Cleptes* Latreille, 1802, *Heterocoelia* Dahlbom, 1854, *Cleptidea* Mocsary, 1904, and *Godfrinia* Kieffer, 1911. It is probable that the last two are either congeneric or only subgenerically distinct. The Cleptinae are a more generalized and primitive group than the Amiseginae or Adelphinae, and may be separated from them as follows: head much wider than high; eyes comparatively much

smaller and not bulging; mandibles in both sexes robust and with several apical teeth; malar space shorter, not longitudinally grooved; sculpture of lower part of front not differentiated from that on upper part; upper part of front with median groove; thorax relatively broader, the width about two-thirds the length; abdomen relatively longer, the first two segments subequal in length to the third and fourth; anterior terga flexed under laterally, but not divided into distinct laterotergites by a groove; and first sternum without a median keel.

The remaining subfamilies of the first division, the Amiseginae and Adelphinae, are very closely related, and future material may demonstrate that they should be merged into a single subfamily. The chief differences of importance between them are: the lateral surface of pronotum in Adelphinae has a marginal groove above, which is lacking in Amiseginae; the posterolateral pronotal lobes touch the tegulae in the former but are separated from the tegulae in the latter group; the mid coxae are narrowly separated in Adelphinae, contiguous in Amiseginae; in the females of Adelphinae the tarsal segments beneath have moderately dense, suberect bristles, while in the Amiseginae they have two rows of tiny spines; in the males of *Adelphe*, the only adelphine in which males are known, the mandible is a relatively huge, flattened, foliaceous structure with one or two small acute teeth at tip, while in the Amiseginae the mandible is much less developed though it is more robust, broader and flattened on one or two sides as contrasted with the slender, subulate mandible of females.

Amiseginae

Subfamily Characterization

Sexual dimorphism is very slight in the genera which are fully winged in both sexes, exhibited only in shape of mandibles, and characters of retracted abdominal segments (and characters of hind tarsi of *Duckeia*). In most of the genera in which the females are brachypterous or wingless, the males are fully winged and there is strong sexual dimorphism.

Head (figs. 1-2, 5-12) in frontal view usually narrow and elongate, more or less pyriform in outline, the eyes moderately to strongly bulging, malar space moderately to well developed; labrum rudimentary, largely concealed beneath clypeus, apical margin rounded; clypeus without a median longitudinal carina; mandibles in female (fig. 4) slender, more or less circular in cross section and tapering gradually to an acute tip, in male more robust, broader and flattened on one or two sides (fig. 4a); labial palpi 3-segmented, maxillary palpi 4-segmented; antennae geniculate, 13-segmented; inner rim of antennal insertion rather strongly raised; scape very elongate, from a half to a third as long as rest of antenna, or as long as the pedicel and first two or three flagellar segments except in *Indothrix*; pedicel also elongate and from one-third to seven-eighths as long as the first flagellar segment except in *Indothrix*; the first flagellar segment also elongate and from one and a third to five times as long as the second; lower half or two-thirds of front broadly and shallowly concave (flat in *Cladobethylus* and *Colocar*), upper part of front flat and without a narrow median groove; ocelli slightly to moderately separated, small except in *Rohweria*, the posterior pair rather narrowly separated from inner eye margins; temples very poorly developed, obtusely angulate behind opposite upper fourth of eye in females; head beneath broadly and shallowly concave on posterior third.

Thorax (figs. 13-24) rather narrow, about twice or more as long as broad; pronotum large, extending posterolaterally as lobes almost to tegulae in fully winged and brachypterous forms, these lobes divergent as viewed from above; the dorsal surface of pronotum more or less quadrate and lacking a marginal furrow on disk anteriorly and laterally; prepectus present.

Fully winged, brachypterous or apterous; venation as figured (figs. 32-34), hind wing in fully winged forms without anal lobe; transverse median vein of forewing meeting medial vein beyond origin of the basal vein.

Legs (figs. 26, 27) rather slender, long erect setae very sparse; coxae contiguous, the hind pair above at base without a small erect lamella; trochanters one-segmented; hind femur abruptly narrowed near base, this narrow basal portion often paler in color thus causing hind trochanter to be apparently two-segmented; tibial spurs 1-2-2, the smaller one on hind tibia vestigial; fore tarsus without comb; tarsi with two rows of tiny spines beneath.

Abdomen (figs. 28-31), short, relatively broad, usually rather strongly flattened, the venter convex, with four visible segments (occasionally the fifth and sixth somewhat exserted in males); first and second segments very large, constituting about four-fifths of the entire length; first two or more visible terga with distinct laterotergites which are abruptly flexed under in forms with strongly flattened abdomens; first sternum with a well-developed rounded median keel on basal half; apical retracted segments in female very elongate, each telescoped within the preceding as in other Chrysididae.

Key to Genera of Amiseginae

1. Wings well developed and functional 2
— Wings reduced to small pads no larger than tegulae, or apparently entirely absent 10
2. Postscutellum a narrow transverse sclerite, its length in middle 0.2-0.4 times as long as scutellum; occipital carina absent; dorsum of propodeum rounded posterolaterally; both sexes; AMERICAN SERIES 3
— Postscutellum much more developed, 0.75-1.6 times as long as scutellum; occipital carina present dorsally and laterally; dorsum of propodeum dentate or angulate posterolaterally; AUSTRALASIAN SERIES 5
3. Malar space quite long, 0.6 times as long as eye height; temple with a strong flange posteriorly; frontal concavity coarsely rugose; posterior surface of propodeum abruptly declivous; pronotum with a deep median groove on posterior half; Brazil .....*Duckeia* Costa Lima
— Malar space relatively short, 0.11-0.17 times as long as eye height; temple not flanged; frontal concavity delicately punctate or finely and closely lineate; dorsal surface of propodeum rounding gradually into posterior surface; pronotum not grooved 4
4. Parapsidal furrows and notaulices both present; front narrower, the interocular distance at anterior ocellus 0.36-0.42 times the head width; pronotum relatively shorter, 0.92-0.97 times as long as scutum; Neotropical Region .....*Amisega* Cameron
— Parapsidal furrows present, notaulices absent; front broader, the interocular distance at anterior ocellus half the head width; pronotum relatively longer, 1.25 times as long as scutum; Nearctic Region *Mesitiopterus* Ashmead
5. Enclosed median triangular area of postscutellum not differing in sculpture from lateral areas; darkened streak almost closing marginal cell curved abruptly inward and upward from stub of radial vein; dorsum of propodeum posterolaterally with a long, acute spur; males unknown; Borneo and Burma .....*Atopogyne*, new genus
— Enclosed median area of postscutellum variable in shape, the sculpture different from that of lateral areas; darkened streak almost closing marginal cell curving evenly outward and upward from stub of radial vein; dorsum of propodeum posterolaterally with only a small, blunt angulation 6
6. First and second terga with larger punctures separated by interspaces not much larger than the diameter of a puncture; hind coxa above without a carina basally along outer margin; females known; Australia .....*Myrmecomimesis* Dalla Torre
— First and second terga with finer, sparser punctures, the interspaces never less than three times the diameter of a puncture, and frequently much greater; hind coxa above carinate basally along outer margin except in *Indothrix*; Oriental forms 7

7. Mesopleuron rather uniformly sculptured, upper part without an oblique furrow; antennae very elongate, intermediate flagellar segments at least 3.5 times as long as wide 8
— Mesopleuron above with an oblique furrow separating a moderately small triangular area which is more delicately sculptured than rest of disk; antennae much shorter except in *Cladobethylus* where intermediate flagellar segments are 3.0 times as long as wide 9
8. Hind coxa carinate above at base along outer margin; pronotum strongly convex, with a short median groove posteriorly, the posterior margin abruptly declivous and quite thick; intermediate flagellar segments not tuberculate beneath near base; apical margin of second sternum straight or very slightly and broadly incurved; females unknown; Philippines .....*Colocar*, new genus
— Hind coxa not carinate above at base; pronotum moderately convex, without median groove, posterior margin not thickened; intermediate flagellar segments beneath with a small subbasal tubercle; posterior margin of second sternum with a relatively deep, median emargination; females unknown; India .....*Indothrix*, new genus
9. Antenna elongate, intermediate flagellar segments 3.0 times as long as wide; head very elongate, the height greater than width, the lower front with strongly converging sides; abdominal sterna with only a few scattered hairs; body with only weak metallic reflections; females unknown; Philippines .....*Cladobethylus* Kieffer
—. Antenna shorter, intermediate flagellar segments at most 1.5 times as long as wide; head shorter, the width a bit greater than height; abdominal sterna rather densely haired; body strongly metallic blue; females unknown; Philippines .....*Rohweria* Fouts
10. Scutum without lateral lobes; tegulae and wing pads present, visible; malar space with a longitudinal groove; tarsal claws with an erect inner tooth; posterolateral angles of thoracic dorsum dentate; hind basitarsus as long as or a bit longer than second through fourth segments; AUSTRALASIAN SERIES 11
— Scutum with lateral lobes which conceal tegulae and wings if vestiges of these are present; malar space not grooved; tarsal claws simple; posterolateral angles of thoracic dorsum rounded; hind basitarsus as long as or a bit longer than second and third segments; AFRICAN SERIES 13
11. Pronotum 1.2 times as long as combined lengths of scutum, scutellum and postscutellum, strongly convex, and without a median groove on posterior half; parapsidal furrows absent; dorsal surface of propodeum well developed, rounding gradually into the oblique posterior surface; head width 0.9 times the head height; males unknown; New Guinea .....*Exopapua*, new genus
— Pronotum 0.6-0.8 times as long as combined lengths of scutum, scutellum and postscutellum, with a median groove on posterior half; parapsidal furrows strongly developed; dorsal surface of propodeum

short, especially in middle, the posterior surface abruptly declivous and perpendicular to dorsal surface; head width 1.1 times the height 12

12. Posterior surface of propodeum above with four acute teeth, the outer pair very long, as long as first flagellar segment; scape as long as pedicel and first three flagellar segments; pronotum strongly convex; fused metapleuron and lateral surface of propodeum smooth; males unknown; Australia .....*Exova* Riek

— Posterior surface of propodeum above with only a lateral pair of acute teeth which are shorter than first flagellar segment; scape as long as pedicel and first two flagellar segments combined; pronotum rather weakly convex; fused metapleuron and lateral surface of propodeum partly or wholly punctate or rugulose; males known; Australia .....*Myrmecomimesis* Dalla Torre

13. Thoracic dorsum with coarse, confluent punctures arranged in longitudinal rows; apical margin of postscutellum not extending to apex of thoracic dorsum, the propodeum with a definite dorsal surface along midline; femora beneath and tibiae above with long, erect scattered setae; upper part of head with coarse, confluent punctures; males unknown; Zululand and Southern Rhodesia *Alieniscus* Benoit

— Thoracic dorsum with small scattered punctures, or finely lineate; apex of postscutellum in middle coinciding with apex of thoracic dorsum, the propodeum without a dorsal surface along midline; femora beneath and tibiae above without erect setae; upper part of head with small separated punctures 14

14. Frontal concavity with fewer, strong transverse rugae; thoracic dorsum finely and closely longitudinally lineate; antennal flagellum short fusiform; median pronotal length twice that of postscutellum; known from both sexes; Pondoland .....*Reidia*, new genus

— Frontal concavity with more numerous, arched carinae; thoracic dorsum with fine shagreening and scattered fine punctures; antennal flagellum filiform; median pronotal length about 1.3 times as long as postscutellum; males unknown; Cape Town *Obenbergerella* Strand

The American Series

This series includes at present three genera, *Amisega, Mesitiopterus* and *Duckeia,* all known in both sexes. It is the most primitive assemblage in the subfamily and rather easily separable from the more specialized Australasian and African Series of the Old World fauna. The following characters are common to all three genera except as noted, the character peculiar to this series alone being set in italics: malar space with longitudinal

groove which is weak in *Mesitiopterus;* eyes bare or with extremely short setae; *occipital carina absent*; dorsum of pronotum without median longitudinal groove except in *Duckeia;* tegulae and wings normal in size; parapsidal furrows present, notaulices present except in *Mesitiopterus,* the scutum not expanded laterally; mesopleural disk not margined anteriorly by a groove; *postscutellum very narrow;* posterolateral angles of thoracic dorsum rounded; *propodeum with a median longitudinal carina,* the dorsal surface of propodeum *rounding gradually or abruptly into posterior surface,* the latter oblique or perpendicular to dorsal surface; tarsal claws with an erect inner tooth; hind basitarsus as long as or a bit longer than the second through fourth segments combined; first three abdominal terga with laterotergites set off by delicate grooves.

AMISEGA Cameron

(Figures 1, 13, 31, 32)

Amisega Cameron, 1888. Biol. Centr.-Amer., Hym., 1: 457.

Genotype: *Amisega cuprifrons* Cameron, 1888. Monotypic and by designation of Ashmead, 1902.

This appears to be the most primitive of the known Amiseginae. It is readily differentiated from all genera by the following combination of characters: well developed wings in both sexes; presence of both notaulices and parapsidal furrows; very short postscutellum; rounded posterolateral angles of propodeal dorsum; absence of a furrow along the oblique anterior margin of the mesopleural disk; and tarsal claws with an erect inner tooth.

Nothing is known as to the host relationships, though the closely related *Mesitiopterus kahlii* Ashm. has been reared from eggs of the walking stick *Diapheromera femorata* Say.

Female and Male.—Head as figured (fig. 1), delicately punctured, 1.2 times as wide as thoracic width at posterolateral prothoracic angles; male mandibles robust, the outer surface flattened and inferior surface with a broad sulcus with rather dense long setae; malar space moderately developed, from one-sixth to one-ninth as long as eye height; eyes bare; frontal concavity without a median carina, a narrow median groove present on lower half, the sculpture elsewhere either entirely smooth with some scattered punctures or very closely, transversely lineate; inner eye margins converging very slightly toward vertex, the interocular distance at lower

ends of eyes about 1.1 times the interocular distance at level of anterior ocellus; front rather narrow, its width at anterior ocellus from 0.36 to 0.45 times the head width at that point; antennal scape elongate, about as long as pedicel and first two flagellar segments combined; flagellum elongate fusiform, the segments circular in cross section, decreasing gradually in length until the sixth where they are about as broad as long; vertex very feebly convex, rounded evenly into front.

Thorax (fig. 13) finely sculptured; venation as figured (fig. 32), differing from *Atopogyne* chiefly in that the costa of forewing is not produced beyond stigma and the darkened streak nearly closing the marginal cell is curved evenly from stub of radial vein; pronotum 0.92-0.97 times as long as scutum; scutellum from two-thirds to a half as long as scutum; postscutellum very short, a fourth to a sixth as long as scutellum; length of propodeum from base to transverse groove just before posterior declivity from two-thirds to almost as long as scutellum; metapleuron with posterior margin indicated by a broad, shallow groove and the endophragmal pit; dorsal surface of propodeum rounding gradually into the oblique posterior surface, both surfaces bisected by a strong carina which is margined on each side by a row of foveolae, laterad of this a smooth area and then a foveolate impression curving inward toward abdominal attachment, and the lateral margin also foveate; dorsal surface with a transverse, arcuate, foveolate impression near its apex.

Femora beneath with some soft, scattered erect hairs; tibiae above usually without erect setae; hind femur extending almost to apex of abdomen.

Abdomen as figured (fig. 31), delicately sculptured, strongly flattened, dorsoventral line at base of second tergum about two-thirds as long as width of abdomen at that point; first tergum with sides straight on basal half, top of declivity without a transverse groove, and declivity broadly and shallowly concave.

Included forms: 1. *aeneiceps* Ducke, 1903; ♀ ♂; Amazonia from the Guiana coast to Teffè in Amazonas, Brazil

2. *aeneiceps* var. *azurescens* Ducke, 1903; ♀ ♂; no localities specified, presumably occurring with the typical form

3. *cooperi*, new species; ♀ ♂; Turrialba, Costa Rica

4. *cuprifrons* Cameron, 1888; "♀" = ♂; Bugaba, Panama

5. *mocsaryi* Ducke, 1902; ♀ ♂; all Amazonia from the Atlantic Ocean to Peru

6. *mocsaryi* var. *cyaniceps* Ducke, 1911; ♀ ♂; no localities specified, presumably occurring with the typical form.

Species studied: ♀ *aeneiceps*, ♀ ♂ *cooperi* and ♀ *mocsaryi* var. *cyaniceps*.

Amisega cooperi*, new species Figs. 1, 13, 31, 32.

The female of this species is readily distinguished by the following combination of characters: the fasciate forewing; coppery dorsum of head and thorax, dark blue on propodeum and rest of head, and dark green mesopleuron; densely and minutely punctate thoracic dorsum; and very sparsely punctate frontal concavity. In the male the head and thorax are dark blue with some green reflections on lower part of mesopleuron, the forewing is fasciate though not so markedly as in female since the infumated areas are much lighter and the vestiture sparser, the punctation of head and thoracic dorsum is somewhat sparser and composed of larger punctures, and the frontal concavity is very sparsely punctate.

A. cuprifrons Cameron, described from a single specimen, supposedly a female, from Bugaba, Panama, is apparently the closest relative. Dr. Yarrow writes that the type is actually a male, that the base of the forewing is less infumated than the apex but with no definite pale band, and that the head and thorax have coppery reflections, the propodeum dark blue and green. The type of *cuprifrons* is also substantially larger than *cooperi*, 9 mm. long as compared to 5.4-6.0 mm.

This species exhibits rather marked sexual dimorphism, the male lacks any coppery coloration, but has somewhat larger and sparser punctures on dorsum of head and thorax, a more weakly infumated forewing with sparser and suberect pubescence, and a slightly broader face. The association of sexes is based on several factors: the entire series was taken at Turrialba, Costa Rica, on young banana leaves just before storms from June 14 to 24, 1949; the frontal concavity, propodeum and abdominal tergites are each similarly sculptured; the two sexes are similar in size; and both sexes have a pair of narrow ferruginous stripes on mesosternum which do not occur in the other known members of the genus. The possibility exists, of course, that the female associated here with *cooperi* may actually be the opposite sex of *cuprifrons*.

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* It is most fitting that this spectacularly beautiful species should be named for its collector, Kenneth W. Cooper, Head of the Department of Biology, University of Rochester, who has enriched the collections of the U. S. National Museum by the generous donation of most of his personal collection of wasps.

Type. ♂; Turrialba, Costa Rica; 49 f 22 (i.e., June 22, 1949) (K. W. Cooper; on young banana leaf at jungle edge just prior to storm) [U. S. National Museum, Type No. 63229].

MALE.—Length 5.4 mm., forewing including tegula 4.3 mm. Shining, mostly dark metallic blue, the abdomen almost black; inner eye margins narrowly, lateral surface of pronotum posteriorly, mesopleuron except upper fourth, and upper third of metapleuron with metallic green reflections; antennae and legs black, antennal scape and coxae with metallic reflections, the mid and hind femora with a basal, light brown annulus, and fore and mid tarsi light brown; mesosternum with a pair of narrow ferruginous stripes. Erect vestiture of head and thoracic dorsum long, moderately dense, black; that on sides of thorax, legs and abdomen light brown. Forewing less infumated than in female, with a moderately wide, clear fascia across wing at stigma, the vestiture suberect, dark, sparser than in female, stigma and veins dark brown; hind wing clear.

Head with punctures relatively larger and a bit sparser than in female; ocelli as in female; interocular distance at anterior ocellus 0.45 times the head width; antenna similar to that of female, relative lengths of segments from scape as 31:9:17:12:10:8:7:7:6:6:6:6:7, the first flagellar segment 0.65 times as long as interocular distance at anterior ocellus.

Punctures on thorax sparser than in female, relatively larger, particularly those on pronotum; propodeum sculptured similarly to that of female.

Legs as in female.

Abdomen in general punctured like that of female, but punctures on second tergum denser and covering most of tergum except for a very narrow median strip and moderately broad posterior margin.

Allotype. ♀; same data as type but 49 f 14-1 (i.e., June 14, 1949) [USNM].

FEMALE.—Length 6.0 mm., forewing including tegula 4.6 mm. Head above and thoracic dorsum coppery; rest of head and propodeum dark blue; mesopleuron dark green; antennae and legs black, with some green reflections; abdomen deep blue-black with some castaneous at base of first tergum; mesosternum with a pair of narrow ferruginous stripes. Head above with short, erect, sparse, light brown hair; thorax above with similarly colored, subrecumbent hair; head beneath, thorax on sides and beneath, femora beneath, and abdominal sterna with a bit longer, suberect, cinereous hair. Forewing strongly infumated but with a clear, moderately wide fascia across wing at stigma; forewing with dense decumbent setae which are dark brown on the infumated areas and cretaceous on the clear fascia; veins of forewing dark brown in infumated areas, stigma and veins in clear section testaceous; hind wing pale, with sparser, scattered, suberect setae.

Head shining; frontal concavity mostly smooth, with a short median groove extending a fourth of distance to anterior ocellus, elsewhere with

scattered, small punctures; punctures laterad of and above concavity larger and subcontiguous; punctures on vertex contiguous, smaller than those before ocelli, becoming smaller toward occiput; ocelli in a large low triangle, the posterior pair very narrowly separated from inner eye margins, the postocellar line 1.5 times as long as distance between anterior and posterior ocelli, and about five times the ocellocular distance; interocular distance at anterior ocellus 0.38 times the head width; antenna moderately long, relative lengths of segments from scape as 37:11:19:13:11:10:8:8:7:6:6:6:8, the first flagellar segment 0.8 times the interocular distance at anterior ocellus.

Dorsum of thorax subopaque from dense punctation, propodeum and side of thorax shining; sculpture of dorsum and side of thorax as figured (fig. 13).

Femora beneath with scattered, long, erect hairs; tibiae without erect vestiture.

Abdomen shining; first tergum with a band of small punctures posteriorly, which is narrower in middle than laterally; second tergum with a small patch of similar punctures on side in middle extending almost to midline; third tergum with a band of close minute punctures at base of exposed portion; fourth tergum with close minute punctures; second sternum with rather large, dense punctures; third and fourth sterna with small, rather dense punctures and a few interspersed larger ones.

Paratypes. 1 ♀; same data as allotype. 1 ♀; same data as type but 49 f 16 (i.e., June 16, 1949). 1 ♂; same data as type but 49 f 24 (i.e., June 24, 1949). All specimens were taken on young banana leaves just prior to storms, and presumably were attracted to some exudate on the leaves found only at that time. Dr. Cooper also collected a series of one female and three males of a species of *Adelphe* between June 23 and July 10, 1949, under precisely the same conditions. A female paratype has been placed in the Academy of Natural Sciences of Philadelphia.

The paratypes are very similar to the type and allotype in most respects. The June 16 female is 5.4 mm. long, and the single male paratype is 5.0 mm. long. The June 14 female has fewer punctures on first and second abdominal terga.

MESITIOPTERUS Ashmead

(Figure 4)

Mesitiopterus Ashmead, 1902. Canad. Ent. 34: 231.

Genotype: *Mesitiopterus kahlii* Ashmead, 1902. By original designation (two included species).

Apparently *Mesitiopterus* is a closely related derivative of *Amisega*, and it may be separated from that genus by the few characters listed below.

FEMALE AND MALE.—Head as in *Amisega* except as follows: frontal concavity with close transverse carinae; front comparatively broader, its width at anterior ocellus half the head width; eyes with very short, scattered, erect setae; antennal scape a bit shorter than combined lengths of pedicel and first two flagellar segments.

Thorax as in *Amisega* except as follows: pronotum about 1.25 times as long as scutum; parapsidal furrows present: notaulices absent.

Legs and abdomen as in *Amisega*.

Included species: 1. *kahlii* Ashmead, 1902; ♀ ♂; New York, Pennsylvania, Maryland, Virginia, North Carolina, West Virginia, Wisconsin, Minnesota, Kansas; reared from eggs of *Diapheromera femorata* Say.

2. *townsendi* Ashmead, 1902; ♂; Jicoltepec near San Rafael, Vera Cruz, Mexico.

Species studied: the two listed above.

Mesitiopterus kahlii Ashmead Fig. 4.

Mesitiopterus kahlii Ashmead, 1902. Canad. Ent. 34: 231 (♂; Lawrence, Kansas; type in U. S. National Museum).—Bodenstein, 1939. Trans. Amer. Ent. Soc. 65: 128 (cited in genotype list).—Milliron, 1950. Proc. Ent. Soc. Wash. 52: 47 (biology).—Bodenstein, 1951. U. S. Dept. Agr., Agr. Monogr. 2: 726.

There are two known rearing records for this species from eggs of *Diapheromera femorata* Say in Minnesota and Wisconsin. The species has also been collected from New York to North Carolina and in Kansas. It is quite possible that it has a much wider range than is known now, for the genus of walking stick whose eggs it parasitizes is known from practically all the United States and south into Mexico.

There is considerable variation in the material before me, especially with regard to coloration of the legs and antennal scape, and sculpture of the thorax. However, these differences are not correlated with any distributional pattern, and apparently the species is variable in these characters. In the females the antennal scape and legs are testaceous except for infuscated hind tarsi, and occasionally some infuscation on scapes, hind femora

and tibiae. The males from Minnesota and Kansas are colored similarly to the females, but the other males have the appendages more infuscated, variably so in the Wisconsin specimens, and uniformly darker in the eastern males. The sculptural differences appear to be correlated with size, the larger specimens being more closely punctate on mesopleuron and having the punctures on vertex and dorsum of pronotum and scutum more definitely arranged in transverse rows. This condition is especially apparent in the North Carolina female which is larger (4.6 mm. long) than the other females (2.8-3.3 mm. long). It is possible that this North Carolina specimen had another host than *Diapheromera*.

Very little is known of the behavior of adults of this species. H. K. Townes advises me that his North Carolina specimen was collected while it was crawling over leaves on the ground in a cutover area through the woods along a power line.

Specimens examined: 9 ♀♀, 18 ♂♂ from the following localities:

New York: 1 ♂; Youngstown; 8-9-34 (F. W. Fletcher) [USNM].

Pennsylvania: 1 ♂; Lehigh Co.; August 8, 1937 (S. C. Schell) [USNM].

Maryland: 1 ♂; Plummer's Is.; September 12, 1909 (J. C. Crawford) [USNM].

Virginia: 2 ♀♀, 9 ♂♂; Short Hill, Hillsboro; August 26, 1944 (J. C. Bridwell) [USNM].

North Carolina: 1 ♀; Hamrick; August 17, 1950 (H., M., & D. Townes) [HKT].

West Virginia: 1 ♂; Lost River State Park, Hardy Co.; August 28, 1956 (K. V. Krombein) [KVK].

Wisconsin: 1 ♀, 2 ♂♂; Menominee Indian Reservation, Oconto Co.; reared from eggs of *Diapheromera femorata* Say collected October 29, 1953—wasps emerged in laboratory January 1954 (H. J. McAloney & A. T. Drooz) [USNM].

Minnesota: 5 ♀♀, 3 ♂♂; Brainerd; reared from eggs of *Diapheromera femorata* Say collected the summer of 1947—wasps emerged June 11-20, 1948 (A. C. Hodson) [USNM].

Kansas: 1 ♂; Lawrence; July 7, 1896 (H. Kahl) [USNM—the type].

Mesitiopterus townsendi Ashmead

Mesitiopterus townsendi Ashmead, 1902. Canad. Ent. 34: 231 (♂; Jicoltepec near San Rafael, Vera Cruz, Mexico; type in U. S. National Museum).

This species is still known only from the unique male type. It is distinguished from *kahlii* by having the head and thorax

black with rather weak bronzy reflections as contrasted to a green with strong bronzy reflections, and by having the scutellar punctures confluent transversely rather than well separated.

DUCKEIA Costa Lima

(Figures 2, 14)

Duckeia Costa Lima, 1936. Libre Jubilaire E. L. Bouvier, p. 174.

Genotype: *Duckeia cyanea* Costa Lima, 1936. Monotypic and by original designation.

Duckeia is rather remotely related to *Amisega* which probably represents the archetypal amisegine. *Duckeia* has traveled quite a distance toward the more specialized genera of the Australasian and African Series as shown by the development of a relatively larger malar space thus giving the head a pyriform outline in frontal view, of a coarsely rugose frontal concavity, of a relatively larger postscutellum, and of an abruptly declivous posterior surface of the propodeum. Its affinities with the New World series of genera instead of with one or the other of the Old World series are shown by the absence of dentate posterolateral angles of the propodeal dorsum, absence of setae on the eyes, presence of an inner tooth on tarsal claw, and absence of a groove along the anterior margin of the mesopleural disk.

Duckeia has also digressed in its host relationship. It parasitizes the eggs of a walking stick which are deposited in a row on foliage, whereas the other genera for which we have rearing records (*Mesitiopterus* and *Myrmecomimesis*) are parasitic in the walking stick eggs which are broadcast singly and at random on the ground.

Female and male.—Head as figured (fig. 2), coarsely punctate, 1.1 times as wide as thoracic width at posterolateral prothoracic angles, its width slightly greater than its height from apex of clypeus to occiput; clypeus with a low, rounded transverse ridge; mandibles of female normal for subfamily, of male robust, flattened, obliquely truncate at apices; malar space well developed, about 0.6 times as long as eye height; frontal concavity deep, with coarse transverse carinae, without a median carina, the lower fourth with a narrow shallow median groove; eyes bare; inner eye margins converging rather strongly toward vertex, the interocular distance at lower ends of eyes 1.4 times the interocular distance at level of anterior ocellus; front rather narrow, its width at anterior ocellus 0.45 times the head width at that point; antennal scape elongate, slightly concave beneath,

as long as pedicel and first three flagellar segments combined; flagellum broad fusiform, the fourth to eleventh segments flattened beneath; front abruptly declivous just in front of anterior ocellus; vertex very slightly convex; temples with a strong flange posteriorly.

Thorax (fig. 14) coarsely punctate, in profile rather strongly arched; venation as in *Amisega*; pronotum, scutum, scutellum, postscutellum and propodeum present dorsally, separated by well-defined sutures, that between pronotum and scutum very deeply impressed; pronotum on posterior half with a deep median groove separating two rounded prominences; scutum strongly convex, 1.3 times as long as pronotum; scutellum flat on disk, half as long as scutum; postscutellum flat, 0.4 times as long as scutellum; propodeum short, the dorsal surface to posterior transverse carina a bit shorter than scutellum; metapleuron with posterior margin indicated by a shallow groove and the endophragmal pit; dorsal surface of propodeum rounding into the almost perpendicular posterior surface, both surfaces bisected by a strong median carina which is margined on each side by a row of elongate foveae, laterad of this a foveate impression curving inward toward abdominal attachment, the two surfaces separated from each other by a rather weak curved carina and from the lateral surfaces by a strong carina.

Femora beneath and tibiae above with some soft, scattered erect hairs; hind femur extending almost to apex of abdomen; hind tarsus of male strongly expanded and flattened beneath.

Abdomen coarsely sculptured, the dorsum rather flat, but venter strongly convex, dorsoventral line at base of second tergum nearly three-fourths as long as abdominal width at that point; first tergum with sides straight on basal half and directed inward, top of declivity with a weak transverse groove, the declivity broadly and shallowly concave and with a narrow median groove on basal half; second sternum narrowly and transversely raised at base in middle.

Included species: 1. *cyanea* Costa Lima, 1936; ♀ ♂; Rio de Janeiro, Brazil; reared from eggs of *Prisopus ohrtmanni* (Licht.).

Species studied: the genotype, ♀ ♂.

The Australasian Series

This complex of genera includes *Myrmecomimesis* and *Exova* from Australia, *Exopapua* of New Guinea, *Rohweria*, *Cladobethylus* and *Colocar* from the Philippines, *Atopogyne* from Borneo and Burma, and *Indothrix* from India. *Myrmecomimesis* is known from both sexes, *Exova*, *Exopapua* and *Atopogyne* are known only from females, and *Rohweria*, *Cladobethylus*, *Indothrix* and *Colocar* are known only from males.

These genera have the following characters in common exclusive of the exceptions noted, the characters peculiar to the series being set in italics: malar space with longitudinal groove; eyes with scattered erect setulae which are longer and denser in male; occipital carina present dorsally and laterally; *dorsum of pronotum with a median longitudinal groove* except in *Exopapua* and *Indothrix;* tegulae normal in size, males of all genera and females of *Atopogyne* fully winged, *other known females with wings reduced to small pads no longer than tegulae;* scutum not expanded laterally, notaulices evanescent or absent, parapsidal furrows present except in *Exopapua;* mesopleural disk margined anteriorly by a groove in all females, but in males of *Rohweria* only; postscutellum very large, covering much of hind part of thoracic dorsum; *posterolateral angles of thoracic dorsum dentate or angulate;* posterior surface of propodeum abruptly declivous and perpendicular to thoracic dorsum except in *Exopapua;* tarsal claws with an erect inner tooth; hind basitarsus as long as or a bit longer than the second through fourth segments combined (unknown in *Colocar*); laterotergites set off by delicate grooves on first three terga in females of *Myrmecomimesis* and *Exova,* and on first four terga in females of *Exopapua* and *Atopogyne* and in all known males.

The Australasian Series is widely separated from the American Series by the amazing development of the postscutellum, and the reduction of wings to small pads in most of the females. In all known males and the female of the fully winged *Atopogyne,* the postscutellum is separated from the dorsum of the propodeum by a well-defined suture, and the apical margin has at the middle a pair of close, recumbent, small blunt teeth. These teeth, or modifications of them, are present also in the brachypterous females, and frequently offer the only clue as to the extent of the postscutellum in those forms, since the postscutellum and propodeum are fused and separated at most by only a shallow furrow, not by a suture. This condition in brachypterous females is well illustrated in figures 16 and 17 of *Myrmecomimesis* and *Exova.*

The discovery of females of some of the other Oriental genera is awaited eagerly. If these are fully winged as is the female of *Atopogyne,* it would seem desirable to separate this assemblage

into an Oriental Series to include all genera included here as Australasian except *Myrmecomimesis*, *Exova* and *Exopapua* which would constitute the derivative Australian Series.

MYRMECOMIMESIS Dalla Torre

(Figures 5, 16, 21)

Myrmecopsis Walker, 1866. Trans. Ent. Soc. London (3) 2: 441. Preoccupied by Newman, 1850.

Genotype: *Myrmecopsis nigricans* Walker, 1866. Monotypic and by designation of Ashmead, 1904.

Myrmecomimesis Dalla Torre, 1897. Wien. Ent. Ztg. 16: 87. New name.

Promesitius Kieffer, 1905. Ann. Soc. Sci. Bruxelles 29: 123. NEW SYNONYMY.

Genotype: *Promesitius flavicollis* Kieffer, 1905. Monotypic and by designation of Riek, 1955.

Ootheres Riek, 1955. Austral. Jour. Zool. 3: 121. NEW SYNONYMY.

Genotype: *Promesitius coeruleus* Kieffer, 1907. By original designation (five included species).

Cresmophaga Riek, 1955. Austral. Jour. Zool. 3: 125. NEW SYNONYMY.

Genotype: *Cresmophaga bispinosa* Riek, 1955. By original designation (five included species).

Dr. Yarrow has furnished notes on certain types in the British Museum which make it possible to establish some of the new synonymy proposed above. He states that although Walker considered the type of *Myrmecopsis nigricans* to be a male cleonymid (Chalcidoidea), it is actually a female of a species probably identical with the type of *Promesitius coeruleus* Kieffer. Therefore, *Ootheres* falls as a definite synonym.

I am also placing *Cresmophaga* Riek in synonymy based on a study of four species placed in *Ootheres* by Riek and three species assigned to *Cresmophaga* including the genotype, plus notes made by Dr. Yarrow on the types of *Promesitius punctaticeps* Kieffer and *P. bimaculatus* Kieffer, species not studied by Riek. Riek distinguishes the two genera by the following couplet (rearranged from Riek):

FEMALES: "abdominal tergites closely punctate (and setose); head above scrobes entirely punctate, punctures coarse and confluent, tending to be longitudinally lined; a distinct foveate zone laterally between postscutellum and propodeum." MALES: "punctures of abdomen as dense on the 2nd segment as on the 3rd, setae dense, the whole surface of abdomen appearing finely setose." .....*Ootheres*

FEMALES: "abdominal tergites glabrous, with scattered fine punctures (and setae); head above scrobes glabrous, with scattered punctures, sometimes close, but discrete; lateral region between postscutellum and propodeum mostly glabrous, wide." MALES: "punctures of abdomen not as dense on the 2nd segment as on the 3rd, setae very short so that the basal abdominal segments appear glabrous between the punctures." .....*Cremophaga*

I have before me paratype males of *Cresmophaga semiglabra* Riek, *C. bispinosa* Riek (the genotype of *Cresmophaga*), *C. rubrifemur* Riek, *Ootheres nigrithorax* Riek and *O. nigripedicel* Riek. In all these species the interspaces between punctures on the abdominal tergites are smooth and shining. The relative density of the punctation and vestiture is somewhat, but certainly not markedly, less in the first three species. These characters by themselves appear to me to be of less than generic importance unless other substantiating criteria can be found.

In the female sex I have the probable type of *Promesitius flavicollis* Kieffer (the genotype of *Promesitius*), *P. coeruleus* Kieffer (the genotype of *Ootheres*), and paratypes of *Ootheres nigripedicel* Riek, *O. iridescens* Riek, *Cresmophaga bispinosa* Riek (the genotype of *Cresmophaga*) and *C. semiglabra* Riek. The second, third and fourth species, which were placed in *Ootheres,* and the first species have short, dense decumbent vestiture on the first two terga in addition to long scattered hairs, whereas the last two species have only the long scattered hairs. The impunctate interspaces are equally shining in all six species.

There is one additional character of the vestiture which appears to separate *flavicollis* and the species Riek placed in *Ootheres* from the species assigned to *Cresmophaga.* This is the presence of long erect setae on the tibiae in both sexes of all species in the first category, and their absence in both sexes of the available species of *Cresmophaga.*

The punctation on the dorsum of the head, the parts above the transversely rugose frontal concavity, is as follows in the females of these six species: coarse, deep and mostly confluent in longitudinal lines in *flavicollis;* the punctures coarse, a little shallower, many of them confluent in longitudinal lines in *coeruleus* and *iridescens;* the punctures coarse, but shallower still, and contiguous to subcontiguous but not arranged in lines

in *nigripedicel;* the punctures coarse, but still shallower, many of them contiguous or subcontiguous but not in lines and with some moderately large impunctate areas in *bispinosa;* the punctures small, shallow and quite scattered in *semiglabra.*

As regards the zone of demarcation laterally between postscutellum and dorsal area of propodeum, the condition is as follows in these six females: a very narrow, curved groove separating two coarsely pitted surfaces in *flavicollis;* a wider foveate zone in *coeruleus, iridescens* and *nigripedicel;* and a wider smooth strip in *bispinosa* and *semiglabra.*

Dr. Yarrow has furnished notes on the types of *P. bimaculatus* Kieffer and *P. punctaticeps* Kieffer, species which were not available to Riek. In *punctaticeps* the vestiture of the abdomen is unlike any of the species discussed above in that long erect hairs are lacking but short decumbent setae are present, the vestiture of tibiae is as in *bispinosa* and *semiglabra,* and zone of demarcation between postscutellum and propodeum is almost flat with striation directed toward posterolateral teeth. In *bimaculatus* the vestiture of the abdomen is as in *bispinosa* and *semiglabra,* but the tibiae have scattered, long erect setae as in *flavicollis, coeruleus, iridescens* and *nigripedicel,* and the zone of demarcation between postscutellum and propodeum is shallower than in *coeruleus* and punctate, each puncture bearing a long black bristle.

When all these data are considered, it is difficult to avoid the conclusion that only one genus is involved. *P. bimaculatus* appears to be annectant between *Cresmophaga* and *Ootheres,* but differs from any species in those groups by having the posterior surface of propodeum punctate rather than rugose. *P. punctaticeps* seems to be closest to *Cresmophaga,* but again differs from any species in either genus by having a different type of abdominal vestiture and in having the first abdominal tergum with close longitudinal striations. The use of different combinations of sculpture and vestiture would require the recognition of at least four genera for this group of species, genera which would scarcely be of equivalent value to the other generic entities recognized in this subfamily. Biological information also corroborates the opinion that only one genus is involved, for to date

several members of *Ootheres* and *Cresmophaga* have been reared from eggs of the same host, *Podacanthus wilkinsoni* Macleay.

The conclusion that *flavicollis* and *nigricans* are congeneric is based on study of a specimen, loaned by the Genoa Museum through Dr. Delfa Guiglia, which is a topotype of *flavicollis* if not the actual type of that species. This specimen agrees almost exactly with Kieffer's original description which is transcribed below.

"Femelle. Tête aussi longue que large, droite en arrière, horizontale depuis le bord postérieur jusqu'au milieu des yeux, puis obliquement déclive en avant jusqu'à la bouche. Yeux très grands, presque hémisphériques, touchant presque le bord postérieur, finement pubescents. Joues égalant le tiers des yeux, séparées des tempes par un sillon; partie postérieure des tempes avec une proéminence obtuse. Ocelles nuls. Antennes de 13 articles; scape cylindrique, atteignant le milieu des yeux, égalant la moitié du flagellum; second article un peu plus long que gros; flagellum légèrement épaissi dans son tiers apical, son premier article presque égal aux quatre suivants réunis, le deuxième aussi long que gros, les suivants transversaux, sauf le dernier, et peu distinctement séparés. Thorax aussi large que la tête, à peu près plan sur le dessus; pronotum subquadrangulaire, à peine plus large que long. Mesonotum n'atteignant pas la moitié de la longueur du pronotum, mais aussi large que lui; sillons parapsidaux convergents en avant, lobe médian deux fois aussi large que les latéraux; près de son bord postérieur se voit l'écailette. Ailes représentées par un lobe de la grandeur de l'écaillete. Scutellum nul. Metanotum subquadrangulaire, aussi long que le pronotum et aussi large que le mesonotum, non distinctement rétréci au milieu, terminé supérieurement de chaque côté, par une dent obtuse et forte, traversé après son tiers basal par une ligne transversale peu marquée; partie postérieure déclive perpendiculairement. Pattes à fémurs légèrement renflés; tous les tibias très faiblement élargis de la base au sommet et munis, en dehors, de longs poils noirs, dressés et alignés; premier article des tarses postérieurs égal aux trois suivants réunis; le quatrième encore deux fois aussi long que large; crochets avec une dent au milieu. Abdomen convexe, ovalaire, à peine aussi long que le thorax, avec quatre segments visibles; pétiole très court; premier segment campanulé, occupant le premier tiers; le second distinctement plus long que le premier; le troisième court; le quatrième à peine visible."

The only discrepancies between Kieffer's description and this specimen are that in the latter the ocelli are present, the parapsidal furrows converge posteriorly, and the scutellum is present.

The ocelli are present and distinct in the specimen but not conspicuous—I do not think Kieffer could have overlooked them, and perhaps his "ocelles nuls" is a slip of the pen for "ocelles présents." The characterization of the parapsidal furrows as "convergents en avant" likewise is almost certainly a lapsus for "convergents en arrière," because these furrows are normally convergent posteriorly or parallel in Hymenoptera. There is a distinct suture between the scutellum and fused postscutellum-propodeum, though it is not as deep nor as evident as that separating the scutum and scutellum. In this case I think Kieffer misinterpreted the true condition. My contention is substantiated by Kieffer's reference to the metanotum being as long as the pronotum. The fused postscutellum-propodeum is decidedly shorter than the pronotum, but if the scutellum is included in the measurement, this part of the thorax *is* as long as the pronotum. In this connection it is significant that Kieffer in describing what he calls the metanotum refers to it as "traversé après son tiers basal par une ligne transversal peu marquée." This transverse line can be nothing but the scutellar-postscutellar suture if my interpretation is correct. There is an additional lapsus in Kieffer's descriptions—in the generic description he states that the specimen is a female, but in the specific description he says that it is a male.

It is almost inconceivable that this specimen could agree in so many of the striking and peculiar details mentioned in Kieffer's generic and specific descriptions, and not be a specimen of the species on which he based these descriptions. That Kieffer's descriptions are not always totally reliable is manifest in Richard's work on the classification of the Dryinidae (Trans. Roy. Ent. Soc. London 104: 51-70, 1953). On page 51 Richards states, "Recent study of the types of species on which some of his [Kieffer's] genera were based shows that it is hazardous to accept his diagnoses at their face value," and on page 59 in discussing the type specimen of *Dryinus niger* Kieffer he says, "It was difficult to recognize this species from Kieffer's description since he states that the pronotum is shorter than the head and hardly as long as the mesoscutum, which is far from true."

Some of the difficulties attendant on working with Kieffer's publications are strikingly demonstrated by some of his later comments on this and other species of *Promesitius*. In 1907 he added three new species to *Promesitius* based on material collected by Turner at Mackay, Queensland, namely *coeruleus, punctaticeps* and *bimaculatus*. Of these, *coeruleus* is stated to have both ocelli and a scutellum, and *bimaculatus* is said to have a scutellum. Kieffer does not mention whether ocelli and scutellum are lacking or present in *punctaticeps,* or whether *bimaculatus* has or has not ocelli. In an accompanying key one of the characters used to separate *flavicollis* and *bimaculatus* from the other two species is " die Teile des Thorax undeutlich getrennt " as contrasted to ". . . deutlich durch Nähte getrennt." In the description of *bimaculatus* he confirms that the sclerites are not separated by sutures, but states that they are separated by more or less distinct transverse impressions. Oddly enough, one character used to separate *flavicollis* from *bimaculatus* is that the abdominal terga of the former are stated to be finely shagreened as compared to smooth with scattered punctures in *bimaculatus,* whereas the original description of *flavicollis* has the first two abdominal terga as shining and finely punctate and the last two as polished and smooth. In a later version of this key (1914) *flavicollis* is said to have the terga finely and delicately punctate and *bimaculatus* to have them smooth with separated punctures. Even more oddly, neither key utilizes the absence or presence of a scutellum to separate the two species.

Dr. Yarrow advises me that the types of *bimaculatus, coeruleus* and *punctaticeps* all have ocelli and a scutellum, and further that there is no difference in thoracic segmentation between *bimaculatus* and the other two.

FEMALE.—Black, black and red, or black and orange, head and dorsum of thorax occasionally with metallic reflections, the abdomen rarely so; head as figured (fig. 5), the width about 1.1 times the height from apex of clypeus to occiput, varying from densely and rugulosely punctate to moderately finely and sparsely so, the frontal concavity transversely rugose; greatest head width 1.15 times the greatest prothoracic width; malar space well developed, 0.25 to 0.36 times as long as eye height; frontal concavity with median ridge weak or lacking; interocular distance at level of anterior ocellus 0.43-0.47 times the width of head at that point;

antennal scape very elongate, as long as pedicel and first two flagellar segments combined; flagellum rather short fusiform, the middle segments somewhat broader than long, the fourth to tenth segments subcircular in cross section, each with a flattened sensory area beneath, vertex flat.

Thorax (fig. 16) usually very coarsely punctured, closely so and confluently in rows dorsally at least on the pronotum, or with smaller, moderately separated punctures; in profile the dorsum forming an even curve, interrupted by the furrows between sclerites; pronotum with median length about 1.2 times the combined length of scutum and scutellum, and 0.62-0.74 times the combined length of scutum, scutellum and postscutellum; postscutellum with a pair of close teeth at apex in middle, the posterior margin rounded; propodeum poorly developed dorsally but with a strong, acute posterolateral tooth which is much shorter than first flagellar segment, the apex in middle usually with a strong, transverse, more or less arcuate keel; posterior surface of propodeum usually transversely rugulose, but punctate in *bimaculatus*.

Femora beneath and tibiae above sometimes with scattered, extremely long, erect setae in addition to the normal decumbent vestiture; hind femur extending to apex of abdomen.

Abdomen not strongly flattened, dorsoventral line at base of second tergum three-fourths as long as abdominal width at that point; the dorsum closely and finely punctate, with or without rather dense, decumbent short setae, and with longer, scattered erect hairs except in *punctaticeps*; first tergum with sides rounded to base, top of declivity without a transverse groove, and base with a small shallow concavity.

Male.—Usually black, the thorax in *iridescens* with metallic reflections, and abdomen in *nigrithorax* blue; sculpture of head much as in female; width of head about 1.2 times the height; interocular distance at anterior ocellus about 0.54 times the width of head; antennal flagellum more elongate, the scape subequal in length to pedicel and first flagellar segment, the intermediate flagellar segments somewhat longer than broad and circular in cross section, without a flattened area beneath.

Thorax (fig. 21) coarsely and closely punctate; venation as in *Amisega* but lacking the lower of two fuscous streaks extending outward from stub of radial vein and with only one fuscous streak extending outward from corner of discoidal cell; forewing with short, moderately dense, erect setae; postscutellum with posterior margin rounded out laterally, incurved just before middle; median length of pronotum equal to that of scutum, 0.50 times as long as combined lengths of scutum, scutellum and postscutellum; mesopleural disk above without an oblique furrow; propodeum better developed dorsally than in female, upper posterolateral angle of propodeum obtusely angulate only; posterior surface of propodeum irregularly rugulose.

Legs as in female.

Abdomen shaped much as in female; punctures larger and denser than in female, most of them separated from each other by the width of a

puncture or less; terga with rather dense decumbent setae, lacking the longer, scattered erect setae.

Included species: 1. *bimaculatus* (Kieffer), 1907, new combination (described in *Promesitius*); ♀; Mackay, Queensland.

2. *bispinosa* (Riek), 1955, new combination (described in *Cresmophaga*); ♀ ♂; Jenolan Caves and Hassan's Walls, New South Wales; reared from eggs of *Podacanthus wilkinsoni* Macleay and *Didymuria violescens* (Leach).

3. *flavicollis* (Kieffer), 1905, new combination (described in *Promesitius*); ♀; Somerset, Cape York Peninsula, Queensland.

4. *nigricans* (Walker), 1866; [= *coeruleus* Kieffer, 1907 (described in *Promesitius*) and *iridescens* Riek, 1955 (described in *Ootheres*)]; ♀ ♂; "Northern Australia" (type of *nigricans*); Mackay, Brisbane, Gogango and Chinchilla, Queensland; Jenolan Caves, New South Wales; reared from eggs of *Podacanthus wilkinsoni* Macleay.

5. *nigripedicel* (Riek), 1955, new combination (described in *Ootheres*); ♀ ♂; Hassan's Walls, New South Wales; reared from eggs of *Podacanthus wilkinsoni* Macleay.

6. *nigrithorax* (Riek), 1955, new combination (described in *Ootheres*); ♀ ♂; Pittwater, New South Wales; Tugun and Goondiwindi, Queensland.

7. *punctaticeps* (Kieffer), 1907, new combination (described in *Promesitius*); ♀; Mackay, Queensland.

8. *rubrifemur* (Riek), 1955, new combination (described in *Cresmophaga*); ♂; Jenolan Caves and Hassan's Walls, New South Wales; reared from eggs of *Podacanthus wilkinsoni* Macleay.

9. *rugosinota* (Riek), 1955, new combination (described in *Cresmophaga*); ♀; Gogango, Queensland.

10. *semiglabra* (Riek), 1955, new combination (described in *Cresmophaga*); ♀ ♂; Jenolan Caves and Hassan's Walls, New South Wales; reared from eggs of *Podacanthus wilkinsoni* Macleay and *Didymuria violescens* (Leach).

11. *striata* (Riek), 1955, new combination (described in *Cresmophaga*); ♀; Gogango, Queensland.

Species examined: ♀ *coeruleus,* topotype (or type) of ♀ *flavicollis,* and paratypes of ♀ ♂ *bispinosa,* ♀ *iridescens,* ♀ ♂ *nigripedicel,* ♂ *nigrithorax,* ♂ *rubrifemur* and ♀ ♂ *semiglabra.*

Myrmecomimesis nigricans (Walker) Figs. 5, 16.

Myrmecopsis nigricans Walker, 1866. Trans. Ent. Soc. London (3) 2: 441 (♀; Northern Australia; type in British Museum).

Myrmecomimesis nigricans (Walker), Dalla Torre, 1897. Wien. Ent. Ztg. 16: 87.—Dalla Torre, 1898. Cat. Hym. 5: 272.

Promesitius coeruleus Kieffer, 1907. Berlin Ent. Ztschr. 51: 290 (♀; Mackay, Queensland; type in British Museum).—Kieffer, 1914. Das Tierreich 41: 291.—Reid, 1941. Trans. Roy. Ent. Soc. London 91: 405, fig. 45. NEW SYNONYMY.

Ootheres coeruleus (Kieffer), Riek, 1955. Austral. Jour. Zool. 3: 122, fig. 3 (♀, ♂; Queensland and New South Wales).

Ootheres iridescens Riek, 1955. Austral. Jour. Zool. 3: 123 (♀, ♂; Gogango and Chinchilla, Queensland; type in Div. Ent. Mus., Canberra, Australia). NEW SYNONYMY.

Dr. Yarrow has compared the types of *nigricans* and *coeruleus* and finds only minor differences between them as follows: in *nigricans* the legs are more red, in *coeruleus* the femora and tarsi are somewhat infuscated; in the former species the flagellum is paler especially the three basal segments and the scape darker; head and thorax black blue rather than dark blue as in *coeruleus*; sides of propodeum and posterolateral spines black in *nigricans*, red in *coeruleus*; and these spines narrow and sharp for their greater length rather than stout as in *coeruleus.* It is probable that these differences are infraspecific, and it seems preferable to treat *coeruleus* as a synonym particularly since there is agreement in all other characters of the coloration, sculpture and vestiture.

I have before me two topotypes of *iridescens,* one of them a paratype. They are very similar to a topotype of *coeruleus* loaned me by the British Museum, differing principally in having some greenish reflections on the thoracic dorsum, and in having the posterolateral propodeal teeth somewhat more narrow and acute. Otherwise they are extremely similar, and I consider that *iridescens* is also a synonym of *nigricans.*

Myrmecomimesis punctaticeps (Kieffer)

Promesitius punctaticeps Kieffer, 1907. Berlin Ent. Ztschr. 51: 291 (♀; Mackay, Queensland; type in British Museum).—Kieffer, 1914. Das Tierreich 41: 291.

Ootheres punctaticeps (Kieffer), Riek, 1955. Austral. Jour. Zool. 3: 123.

The following notes, made by Dr. Yarrow on the type, are supplemental to or corrective of Kieffer's original description: head punctate above especially between posterior ocelli, the interspaces smooth and shining, the punctures finer and more separated than in *nigricans* and *bimaculatus*; ocelli very far apart, set in pits, the posterior pair almost touching eye margins; scutellum present; grooves between postscutellum and propodeum shallower than in *nigricans*, almost flat, with striation directed toward posterolateral teeth; metapleuron and sides of propodeum entirely striate; femora and tibiae without long, scattered erect setae; no other part of body with long erect setae; abdomen with scattered, short decumbent hair; first tergum with fine longitudinal striation (not the second as in Kieffer's descriptions of 1907 and 1914, nor the third as in Kieffer's key of 1914).

Myrmecomimesis bimaculatus (Kieffer)

Promesitius bimaculatus Kieffer, 1907. Berlin Ent. Ztschr. 51: 291 (♀; Mackay, Queensland; type in British Museum).—Kieffer, 1914. Das Tierreich 41: 290.—Riek, 1955. Austral. Jour. Zool. 3: 121.

The following notes, made by Dr. Yarrow on the type, are supplemental to or corrective of Kieffer's original description: head, thorax, abdomen, femora and tibiae with long, stout, scattered black bristles; ocelli in a small triangle as in *nigricans*, posterior pair more removed from eye margins than in *punctaticeps*; top of head with coarse, contiguous punctures; pronotal dorsum with ridging between large regular punctures only at extreme front, posteriorly the punctures separated by smooth interspaces half the width of a puncture; groove between postscutellum and propodeum punctate, each puncture with a long black bristle; lamella at top of posterior surface of propodeum very narrow, scarcely projecting, well posterior to postscutellar spines so that in profile there is an oblique face between postscutellum and posterior surface of propodeum about as long as third tarsal segment; posterior surface of propodeum punctate

and with long black hairs directed upward between posterolateral teeth; abdomen shining, with very remote punctures several times their own diameter apart.

Myrmecomimesis flavicollis (Kieffer)

Promesitius flavicollis Kieffer, 1905. Ann. Soc. Sci. Bruxelles 29: 123 (♀; Somerset, Cape York Peninsula, Queensland; type in Genoa Museum).—Kieffer, 1907. Berlin Ent. Ztschr. 51: 292.—Kieffer, 1914. Das Tierreich 41: 290.—Riek, 1955. Austral. Jour. Zool. 3: 121.

I am redescribing this species from the specimen discussed above in the generic discussion, which almost certainly is the type of this species. This specimen bears several labels. The first is a printed one—Australia, Somerset, L. M. d'Albertis with date, I-75, written in by hand. The second is a small square label with the numeral 97 written by hand. The third is a printed label—Museo Civico de Genova. The fourth is a hand-lettered determination label bearing only the generic name *Promesitius*—Dr. Guiglia advises that this is in Professor Masi's handwriting. In response to my inquiry as to whether this specimen might not actually be Kieffer's type (it had been loaned to me as a specimen of *Promesitius* ?), Dr. Guiglia advised me that she had seen the number 97 in a list of material that Kieffer had described from the Genoa Museum, and that this specimen was certainly the type. The specimen is in reasonably good condition, but is glued to a card with the venter down. The antennae are missing except for the apical seven segments of one flagellum which are glued separately on the card.

Female.—Length 5 mm. Black, prothorax light red, dorsum of abdomen with weak bronzy reflections. Head, thorax, abdominal dorsum, femora and tibiae with stout, scattered, erect, long black setae, the abdomen and legs in addition with dense, shorter decumbent setae.

Head with greatest width 1.1 times the median length from apex of clypeus to occiput; antennae lacking; frontal concavity with about 16 close transverse rugulae separated on upper three-fourths of concavity by a weak median ridge; areas laterad of concavity and top of head with coarse confluent punctures, those on vertex arranged more or less in longitudinal rows; ocelli in a low broad triangle, posterior pair separated from eye margins by about 1.5 times the diameter of an ocellus; face moderately broad, transfacial distance at anterior ocellus half the head width; relative length of last seven flagellar segments as 7:6:5:5:5:5:8, these segments a bit broader than long except for apical one.

Dorsum of thorax and propodeum with coarse, confluent umbilicate punctures, those on pronotum arranged in longitudinal rows; pronotum also with a median groove on posterior two-thirds, the median length 1.2 times the combined lengths of scutum and scutellum, and 0.73 times the combined lengths of scutum, scutellum and postscutellum; postscutellum and propodeum separated by a narrow groove; narrow median third of propodeal dorsum with about six large foveae; lamella separating dorsal and posterior surfaces of propodeum poorly developed, no wider than postscutellar teeth; posterior surface of propodeum with coarse confluent punctures bearing long, erect black setae; posterolateral propodeal teeth stout; mesopleuron with coarse confluent punctures; fused metapleuron and lateral surface of propodeum with close longitudinal rugulae.

First two abdominal terga with the dense small punctures bearing the short decumbent setae, separated by much less than the diameter of a puncture, and with scattered interspersed punctures about twice as large bearing the long erect setae; second and third terga with moderately wide, impunctate apical margins.

EXOVA Riek

(Figure 17)

Exova Riek, 1955. Austral Jour. Zool. 3: 129.

Genotype: *Exova tetraspina* Riek, 1955. Monotypic and by original designation.

Exova, known only from the female sex, is closely related to the other Australian genus, *Myrmecomimesis*, though it is unquestionably generically distinct. In *Exova* the antennal scape is proportionally longer than in *Myrmecomimesis*, the propodeum has four spines of which the posterolateral pair is much longer than in other genera, and the pronotum is proportionally longer and is much more strongly convex than in the other genera (a trend which reaches a climax in *Exopapua* from New Guinea).

Female.—Body black and red, without metallic reflections; head apparently* very similar to that of *Myrmecomimesis* in proportions, mostly with moderately large, subcontiguous punctures except frontal concavity transversely rugulose; malar space well developed, 0.33 times as long as eye height; frontal concavity with median ridge evanescent; antennal scape elongate, as long as pedicel and first three flagellar segments combined; flagellum short fusiform, the middle segments broader

* Both eyes have been mostly destroyed by museum pests in the paratype which was loaned me for study, so I am unable to measure the head width.

than long, the fourth to tenth segments subcircular in cross section and with a flattened sensory area beneath; vertex as in *Myrmecomimesis*.

Thorax (fig. 17) much as in *Myrmecomimesis* but differing as follows: pronotum with rather scattered, moderately large punctures; disk of scutum, posterior two-thirds of scutellum, and postscutellum coarsely and confluently punctate, more or less in irregular lines; prothoracic length 0.78 times the combined length of scutum, scutellum and postscutellum; postscutellum with a pair of separated, obtuse teeth at apex in middle, the posterior margin broadly rounded and not separated from propodeal dorsum by a foveate groove; posterolateral teeth of propodeum strong and very elongate, as long as first flagellar segment; posterior surface of propodeum smooth, above in middle with a pair of short acute teeth which are a third as long as posterolateral tooth.

Femora beneath and tibiae above with some scattered, very long, erect setae in addition to the normal decumbent vestiture; hind femur extending almost to apex of abdomen.

Abdomen with scattered, long erect setae, but without dense decumbent vestiture.

Male.—Unknown.

Included species: 1. *tetraspina* Riek, 1955; ♀; Mt. Tambourine, Queensland.

Species examined: the genotype.

EXOPAPUA, new genus

(Figures 6, 18, 26, 28)

Genotype: *Exopapua nupela*, new species. Monotypic and by present designation.

This monotypic genus, known only from the female sex, seems not at all closely related to the other members of the Australasian-Oriental series of genera. It is set apart at once from the other known females by the relatively greater development of the prothorax as compared to the scutum, scutellum and postscutellum, the long, gently curved propodeal profile, absence of parapsidal furrows, and very strongly flattened abdomen.

Female.—Head as figured (fig. 6), rather delicately sculptured as compared to most species of *Myrmecomimesis*, the height from apex of clypeus to occiput about 1.11 times the width; greatest head width 1.2 times the greatest prothoracic width; malar space well developed, one-fourth as long as eye height; frontal concavity transversely rugulose and with a weak median longitudinal ridge; interocular distance at anterior ocellus 0.38 times the width of head at that point; antennal scape very elongate, as long as pedicel and first three flagellar segments combined, flagellum

very short fusiform, the segments subcircular in cross section, the fifth through tenth broader than long, the fourth through tenth with flattened sensory areas beneath; vertex flat.

Thorax (fig. 18) finely and sparsely punctate as compared with most species of *Myrmecomimesis*, in profile the dorsum not forming an even curve because scutum is depressed well below pronotum; median length of pronotum 1.2 times the combined lengths of scutum, scutellum and postscutellum; dorsal surface of propodeum well developed, with a strong, acute posterolateral tooth on each side and rounding gradually into the posterior surface of propodeum, the latter surface oblique instead of perpendicular.

Femora and tibiae without long erect setae; hind femur extending to apical fourth of abdomen.

Abdomen (fig. 28) very strongly flattened, dorsoventral line at base of second tergum two-thirds as long as abdominal width at that point; first tergum with sides rounded to base, top of declivity without a transverse groove, the extreme base with a very small, shallow concavity.

MALE.—Unknown.

Included species: 1. *nupela*, new species; Finschhaven, Mandated Territory of New Guinea, and Maffin Bay, Dutch New Guinea.

Species examined: the genotype.

Exopapua nupela*, new species Figs. 6, 18, 26, 28.

Type. ♀; Maffin Bay †, Dutch New Guinea; July 1944 (E. S. Ross) [California Academy of Sciences].

FEMALE.—Length 4.0 mm. Black, the head and thorax with extremely weak bronzy reflections except scutellum strong, bright metallic green; mandible, scape at base, tegula, apices of coxae, trochanters, and base of first abdominal tergite light reddish; rest of legs and antennae brownish. Body and legs with no erect setae, the vestiture consisting of decumbent, short silvery setae which are moderately dense on legs, quite dense on scutum, scutellum and two large triangular areas on second abdominal tergum, and quite sparse or lacking elsewhere.

Head shining, as figured (fig. 6) and with proportions as described for genus; punctures moderately large and shallow, contiguous laterad of frontal concavity and becoming more separated on upper front and vertex; ocelli in a large equilateral triangle, the posterior pair almost touching eye margins.

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* Pidgin English for new one.

† 2°00′ S, 138°50′ E. All war-time collections at this station were made in a narrow coastal strip not over 25 feet above sea level. Dr. Ross' recollection is that the specimens of *Exopapua* were taken on foliage.

Thorax as figured (fig. 18) and with proportions as described for genus; pronotum shining and with small scattered punctures and smooth interspaces; scutum dull and with dense minute punctures; scutellum dull and with dense small punctures; postscutellum shining and with small scattered punctures; mesopleuron shining and with very large, shallow close punctures; propodeum and metapleuron smooth and very shiny, the area above abdominal insertion with a few close, arched carinules.

Abdomen as figured (fig. 28); first four terga with scattered small punctures; second tergum also with a pair of large, triangular, closely punctate areas; second sternum with large, shallow, moderately close, elongate punctures.

MALE.—Unknown.

Paratypes. 1 ♀; same data as type, but September 1944 [USNM]. 1 ♀; Finschhafen, Mandated Territory of New Guinea; May 2, 1944 (E. S. Ross). Dr. Ross advises me that the latter specimen will be deposited in the British Museum. The paratypes agree very closely in all details with the type. The one from Maffin Bay is 5.1 mm. long, and the Finschhafen specimen is 4.0 mm.

ATOPOGYNE, new genus

(Figures 24, 34)

Genotype: *Atopogyne lineata*, new species. By present designation (two included species).

I am erecting this genus for two species of winged females from Borneo and Burma, which I supposed at first represented the opposite sex of the Philippine *Rohweria*. It differs from *Rohweria* chiefly in having light red and black integument instead of metallic blue, the scutellum longer than postscutellum instead of the reverse, the enclosed triangular area of the postscutellum sculptured similarly to lateral areas instead of differently so, a long, acute spur on each side of propodeal dorsum posteriorly instead of a weak, blunt tooth, tibiae without long scattered setae, and darkened streak almost closing marginal cell curved abruptly upward from the stub of radial vein toward the costal margin instead of curving evenly outward from the stub of the radial vein. Some of these differences are perhaps of only specific value such as the integumental coloration, or sex-limited such as the different sculpture of postscutellum and armature of propodeum. However, reference to two species of the fully-winged American *Amisega* and *Mesitiopterus* demonstrates that in those

genera the two sexes are not different in the scutellar-postscutellar length ratio, tibial vestiture and venation. Consequently, it seems reasonable to assume that these differences between female *Atopogyne* and male *Rohweria* are actually of generic value.

Atopogyne is unique among females of the Australasian Series of genera because it is fully winged. Superficially it is rather similar in appearance to the fully winged females of the American Series. However, the affinities with the brachypterous Australasian females are shown in the relatively enormous development of the postscutellum, the presence of a groove along the oblique anterior margin of the mesopleural disk, and prominently toothed posterolateral angles of the propodeal dorsum.

FEMALE.—Head with width 1.1 times the height, coarsely and closely punctate except frontal concavity which is transversely rugose; clypeus slightly convex, apex not thickened, the margin rounded; malar space well developed, about one-third as long as eye height; frontal concavity transversely rugose and with a low median ridge; antennal scape elongate, as long as pedicel and first two or three flagellar segments combined; flagellum short fusiform, the middle segments somewhat broader than long, the fourth to tenth segments subcircular in cross section and with flattened sensory areas beneath; interocular distance at anterior ocellus 0.37-0.40 times the head width; vertex and upper part of front flat and in same plane, many of the interspaces closely, longitudinally lineate, the lower part of front abruptly declivous and perpendicular to upper part.

Thorax (fig. 24) with pronotum, scutum, scutellum and mesopleuron coarsely and rather closely punctate, the interspaces with close longitudinal lineations; dorsum of thorax in profile forming an even curve; venation (fig. 34) as in *Amisega,* but costa in forewing present for a short distance beyond stigma, and darkened streak nearly closing marginal cell turning abruptly upward from stub of radial vein; forewing with dense, short decumbent setae; median pronotal length 1.2 times the length of scutum, and 0.55-0.63 times the combined lengths of scutum, scutellum and postscutellum; the latter 0.83-0.86 times as long as scutellum, the median triangular area irregularly rugose as are the lateral areas, the posterior margin broadly rounded; dorsal surface of propodeum on each side with a strong posterolateral spur; posterior surface of propodeum margined above in middle by an arched or sinuate carina, and laterally by straight carinae.

Tibiae without long erect hair, femora occasionally with such hairs; hind femur extending to apex of abdomen.

Abdomen much as in *Rohweria*, but one or more of terga in part longitudinally or arcuately carinate.

MALE.—Unknown.

Included species: 1. *lineata*, new species; ♀ ; Sandakan, Borneo.
2. *rieki*, new species; ♀ ; Burma.
Species examined: those listed above.

Atopogyne lineata, new species Figs. 24, 34.

This species is closely related to *A. rieki* from Borneo, and the chief differences are noted in the discussion of that species.

Type. ♀ ; Sandakan, Borneo (Baker Coll.) [U. S. National Museum, Type No. 63231].

Female.—Length 5.0 mm., forewing including tegula 4.6 mm. Head and abdomen black without metallic reflections; thorax and legs light red except most of dorsal and posterior surfaces of propodeum, and streak on hind femur black; scape, pedicel and first flagellar segment light red, rest of flagellum black except beneath. Head and thorax with short, erect, light brown hair, abdomen with shorter, sparse, decumbent, light brown setae. Basal half of forewing infuscated as are a small spot in marginal cell and a larger spot at apex of wing, the rest of forewing and hind wing entirely pale; setae on forewing dense, dark on infuscated areas, pale elsewhere.

Head dull except frontal concavity, proportions as described for genus except interocular distance at anterior ocellus 0.40 times the head width; frontal concavity with about a dozen transverse ridges which are stronger than in *rieki*; ocelli small and in a small, equilateral triangle, the posterior pair separated from eye margins by almost twice their diameter; antennal scape as long as pedicel and first three flagellar segments combined.

Thorax dull except propodeum shining, the dorsum as figured (fig. 24); median pronotal length 0.55 times the combined lengths of scutum, scutellum and postscutellum; postscutellum 0.83 times as long as scutellum; mesopleuron sculptured like pronotum; fused metapleuron and lateral surface of propodeum with a few longitudinal rugae below and several fine carinae above; posterior surface of propodeum with five ridges radiating upward from the rather broad apex, one median, an outer pair along lateral margins and the other pair equidistant from median and outer ridges, the areas between outer and intermediate ridges with irregular, oblique ridges, the two central areas smooth.

Femora beneath and outwardly with scattered, long erect hairs; hind femora smooth beneath.

Abdomen shining, first tergum with some fine punctures on sides, elsewhere impunctate; second tergum with a small anterolateral area finely and closely, longitudinally lineate with a few interspersed small punctures, the sides elsewhere with fine scattered punctures, the rest of disk impunctate; third tergum and sternum with fine, moderately close punctures on basal two-thirds, the rest impunctate; fourth tergum with close, fine

punctures; second sternum anterolaterally with larger, close punctures, elsewhere with scattered minute ones.

MALE.—Unknown.

Atopogyne rieki*, new species

A. rieki from Burma and *A. lineata* from Borneo are the only two known species of the anomalous genus *Atopogyne*. Although the two are obviously congeneric, they differ in a number of specific characters, and *rieki* may be readily distinguished from *lineata* by the following: smaller size; non-fasciate forewing; pronotum 0.63 times as long as scutum, scutellum and post-scutellum combined rather than 0.55 times; hind femur beneath minutely and irregularly rugulose instead of smooth; first tergum longitudinally carinate on lateral fourth instead of smooth; and second tergum almost completely covered with arcuate carinae meeting behind instead of with only a few straight, weaker carinae anterolaterally.

Type. ♀; Birmanie [Type in Museum National d'Histoire Naturelle, Paris (from Ernest André collection)].

FEMALE.—Length 4.4 mm., forewing including tegula 3.4 mm. Head, dorsal and posterior propodeal surfaces, and abdomen black; carinate areas on first two abdominal terga with weak, very dark green reflections; thorax elsewhere light red; legs mostly dark, but coxae, trochanters, femora narrowly at base, and tibiae at base, light red; antennae dark brown, somewhat lighter basally on scape and first flagellar segment. Head and thorax mostly bare (denuded ?), dorsum of latter with occasional, subrecumbent, very short, light brown setae. Wing membrane light brown, not fasciate, setae on forewing dense, decumbent, light brown.

Head dull except frontal concavity, proportions as described for genus except interocular distance at anterior ocellus 0.37 times the head width; frontal concavity with about 16 tranverse ridges which are weaker than in *lineata*; ocelli arranged in a comparatively larger equilateral triangle than in *lineata*, the posterior pair separated from inner eye margins by somewhat less than the diameter of an ocellus; punctation of dorsal surface of head somewhat more separated than in *lineata*, and, consequently, with the lineate interspaces more prominent; antennal scape as long as pedicel and first two flagellar segments combined.

*It is a pleasure to name this species for E. F. Riek, of the Commonwealth Scientific and Industrial Research Organization, Canberra, Australia, in recognition of his study of the Australian species. Mr. Riek found the specimen which constitutes the type of this species in the André collection in the Paris Museum, and was generous enough to borrow it and place it in my hands for study and description.

Thorax and propodeum dull; median pronotal length 0.63 times the combined length of scutum, scutellum and postscutellum; postscutellum 0.86 times as long as scutellum; punctation of dorsum of thorax and mesopleuron very similar to that of *lineata*; fused metapleuron and side of propodeum with uniform, close, oblique rugulae; posterior surface of propodeum with five radiating ridges as in *lineata*, but areas between central and intermediate ridges transversely rugose, and those between intermediate and lateral ridges obliquely so; dorsum of propodeum irregularly rugose; posterolateral spine of propodeum a bit longer and more slender than in *lineata*.

Femora without scattered, erect hairs; hind femur beneath minutely and irregularly rugulose.

Abdomen shining; first tergum with median half smooth and impunctate, the lateral fourth with fine, close, longitudinal carinae; second tergum with a small, finely punctate, triangular area at base in middle, on each side of which are close, longitudinal carinae which become weaker posteriorly and arch inwardly to meet along midline behind the basal punctate triangle; third and fourth terga with fine, dense punctures; first three laterotergites with fine dense punctures on upper half; second and third sterna with somewhat larger punctures which are denser than in *lineata*.

MALE.—Unknown.

ROHWERIA Fouts

(Figure 8)

Rohweria Fouts, 1925. Phil. Jour. Sci. 26: 515.

Genotype: *Rohweria metallica* Fouts, 1925. Monotypic and by original designation.

The strong metallic blue integument of the head and most of thorax separates males of this genus at once from other males of the Australasian Series. The males of *Cladobethylus* are weakly metallic, but in that genus the antennae are much more elongate, the head very elongate, and the form more slender. Superficially, males of *Rohweria* are rather similar in appearence to males of *Myrmecomimesis* and *Indothrix*, but those genera lack the carina at base of hind coxa above and the oblique groove across the upper third of mesopleuron.

MALE.—Head (fig. 8) with width from 1.1 to 1.2 times the height, usually rather coarsely punctate except frontal concavity which is transversely rugose or smooth; mandibles broad, flattened and obliquely truncate at apex; clypeus with apical margin thickened and sulcate; malar space well developed, about one-third as long as eye height; frontal concavity with or without a median ridge; antennal scape elongate, as long as the

very short pedicel plus first flagellar segment; flagellum stout, all segments longer than broad; interocular distance at anterior ocellus 0.45-0.55 times the head width; vertex and upper part of front flat and in one plane, rounding evenly into the perpendicular front.

Thorax coarsely and closely or more finely and sparsely punctate, in profile the dorsum forming an even curve; venation as in *Atopogyne* (fig. 34) but darkened streak nearly closing marginal cell is curved evenly outward from stub of radial vein, and venation not crowded toward base of wing, the costa ending about two-thirds of distance to apex of wing; forewing with moderately sparse, suberect longer setae; median pronotal length from 1.0 to 1.25 times the length of scutum, and 0.43-0.55 times the combined lengths of scutum, scutellum and postscutellum; postscutellum 1.1-1.7 times as long as scutellum, the median triangular area punctate and differentiated from the smooth or rugose lateral areas, the posterior margin broadly rounded and terminating in middle in a pair of blunt, decumbent teeth; mesopleuron with an oblique groove at upper third; dorsal surface of propodeum on each side with a weak blunt tooth; posterior surface of propodeum margined above in middle by an arched carina and laterally by straight carinae.

Femora beneath and externally, and tibiae externally with scattered, long erect hairs; hind femur extending about three-fourths of distance to apex of abdomen; hind coxa above carinate at base along outer margin.

Abdomen strongly flattened, dorsoventral line at base of second tergum about 0.6 as long as abdominal width at that point; terga with fine, scattered punctures bearing short, subappressed or suberect setae; first tergum with sides rounded to base, top of declivity without a transverse groove, declivous surface with a very shallow, moderately broad concavity.

FEMALE.—Unknown.

Included species: 1. *azurea*, new species; ♂; Iligan and Butuan, Mindanao, Philippines.

2. *metallica* Fouts, 1925; ♂; Sibuyan Island, Philippines.

3. *minor*, new species; ♂; Mt. Makiling, Luzon, Philippines.

Species examined: those listed above.

Rohweria metallica Fouts

Rohweria metallica Fouts, 1925. Phil. Jour. Sci. 26: 516, figs. 1, 2 (♂; Sibuyan Island, Philippines; type in U. S. National Museum).

This is closely related to *R. azurea*, n. sp., from Mindanao, but is specifically distinct in having the metapleuron, lateral areas of postscutellum and entire propodeum black instead of blue, in having only the interior margin of the marginal cell infumated instead of the whole cell, in having a non-foveate groove basad of postscutellar triangle instead of a foveate one, and in having

coarse, shallow contiguous punctures on postscutellar triangle instead of small separated ones.

The single available topotypic male of *metallica* shows that there is variation in some details of the punctation. In this specimen the punctures on posterior two-thirds of pronotum and entire mesonotum are subcontiguous, whereas the interspaces are somewhat broader in the type. This tendency toward somewhat denser punctation is apparent on the scutellum also, though not so marked. The median pronotal groove is stronger in the topotype.

Rohweria azurea, new species Fig. 8.

Type. ♂; Butuan, Mindanao (Baker Coll.) [U. S. National Museum, Type No. 63232].

MALE.—Length 5.1 mm., forewing including tegula 5.1 mm. Shining; head and thorax metallic blue, neck and sides of thorax with some bright green reflections; abdomen very dark blue, almost black; scape stramineous; tegula and legs testaceous, the hind pair browner and those femora with faint bluish reflections. Head and thorax with rather short, dense, erect, light brown hair; abdomen with similar hair which is sparser and suberect. Wings pale except marginal cell infumated.

Frontal concavity with about ten low, transverse ridges and a median longitudinal ridge; areas laterad of concavity and top of head with coarse, shallow contiguous punctures which are not confluent in lines; ocelli large, arranged in a low triangle, ocellocular line a bit less than diameter of a posterior ocellus, anterior and posterior ocelli separated by about the diameter of an ocellus; interocular distance at anterior ocellus 0.49 times the head width; a short median ridge between posterior ocelli extending a short distance back onto vertex; antennae stout, relative lengths of segments beginning with scape as 30:8:22:12:11:11:11:11:11:10:10:10:14, the intermediate flagellar segments about two-thirds as broad as long.

Median pronotal length 1.2 times length of scutum, and 0.52 times the combined lengths of scutum, scutellum and postscutellum; pronotum with coarse, shallow punctures which are contiguous on anterior third and subcontiguous on posterior two-thirds, a well-defined narrow median groove on posterior two-thirds, apical margin broadly arcuate; scutum and scutellum with punctation similar to that on hind part of pronotum but a bit closer; postscutellum 1.2 times as long as scutellum, with a foveate groove basad of equilateral triangular area, the latter area punctured like scutellum; laterad of triangular area is a U-shaped ridge, the area between this ridge and the triangular area with radiating weaker ridges; sides of pronotum and mesopleuron below oblique groove at upper third with coarse, somewhat deeper, subcontiguous punctures; mesopleuron above

oblique groove with small punctures which are somewhat denser posteriorly; metapleuron and lateral surface of propodeum with close longitudinal ridges except a smooth area in middle; propodeal dorsum with an arcuate keel posteriorly on median third, area basad of this keel with about a dozen straight rugae, laterad of this area with an oblique ridge and irregular rugae running between it and keel at lateral margin; posterior surface with a few large foveae just above abdominal insertion; the more or less circular area between these foveae and propodeal dorsum smooth except for a few very short wrinkles at top; triangular area laterad of this roughly circular area smooth except for a series of smaller foveae along the bounding ridges.

First tergum with scattered small punctures on posterior horizontal surface; second tergum with small punctures becoming closer toward midline, but a narrow median strip smooth; second sternum with the punctures a bit larger, many of them separated by not much more than the diameter of a puncture.

FEMALE.—Unknown.

Paratypes. 1 ♂; same data as type. 2 ♂♂; Iligan, Mindanao (Baker Coll.) [all USNM]. The paratopotype has been placed in the British Museum, and a paratype in the Academy of Natural Sciences of Philadelphia.

The paratopotype is quite similar to the type in most details of the punctation and color, but the pronotal punctation shows a tendency toward longitudinal ridging and the length is 5.4 mm. The two paratypes from Iligan are 5.3 and 6.4 mm. long and differ from the type as follows: mesonotal punctation with tendency toward transverse ridging, and legs are comparatively darker.

Rohweria minor, new species

This is distinct from the preceding two species in a number of characters such as the small ocelli, smooth frontal concavity, much more delicate punctation, obtusely angulate hind margin of pronotum, the different antennal proportions, and others.

Type. ♂; Mt. Makiling, Luzon (Baker Coll.) [U. S. National Museum, Type No. 63233].

MALE.—Length 3.6 mm., forewing including tegula 2.8 mm. Shining; head, pronotum, mesonotum, scutellum and postscutellar triangle metallic blue, rest of thorax black; abdomen reddish brown at base, elsewhere very dark blue, almost black; mandible except tip, scape, tegula, and legs stramineous. Head and thorax with short, erect, moderately dense, pale

hair; abdomen with somewhat longer, suberect brownish hair on posterior segments. Wings pale, marginal cell very slightly infumated.

Frontal concavity smooth; areas laterad of and just above concavity with small separated punctures; top of head with small punctures becoming denser toward occiput where they are subcontiguous; ocelli small, arranged in a low triangle, ocellocular line a bit more than diameter of an ocellus, anterior and posterior ocelli separated by twice the diameter of an ocellus; interocular distance at anterior ocellus 0.55 times the head width; no median ridge on vertex; relative lengths of antennal segments beginning with scape as 20:5:10:7:6:6:6:5:5:5:5:4:8, the intermediate segments almost as broad as long.

Medial pronotal length equal to length of scutum, and 0.43 times as long as combined lengths of scutum, scutellum and postscutellum; pronotum with a narrow median groove extending from the obtusely angulate posterior margin almost to anterior declivity, the surface with small punctures mostly separated by about half the width of a puncture; mesonotum and scutellum similarly punctured; postscutellum 1.7 times as long as scutellum; equilateral postscutellar triangle delicately punctate, not grooved at base, margined laterally by a U-shaped series of shallow foveolae; areas laterad of these foveolae and between them and the pair of median decumbent teeth at apex smooth; mesopleuron below oblique groove with coarser, shallow subcontiguous pits, above the groove with a few small scattered punctures except posteriorly where they are denser; metapleuron and lateral surface of propodeum smooth, margined above and posteriorly by a carina; propodeal dorsum with an arcuate carina posteriorly on median third, area basad of this keel with a very few weak rugae, laterad of this area smooth to the bounding carina at side; posterior surface almost entirely smooth except for five weak ridges radiating upward from the broad apex, the pair on each side of the median one forming with the arcuate carina above a more or less circular area which is a little roughened below arcuate carina; a few weak foveolae margining the intermediate ridges along outer edges.

Abdomen above with minute punctures, almost absent on first tergum, very scattered on second and third, and becoming a little denser on posterior terga; sterna with somewhat larger, moderately dense punctures.

FEMALE.—Unknown.

CLADOBETHYLUS Kieffer

(Figure 7)

Cladobethylus Kieffer, 1922. Phil. Jour. Sci. 20: 67.

Genotype: *Cladobethylus cruciger* Kieffer, 1922. By original designation (three species and one variety included originally).

My interpretation of this genus is based on a male specimen from Surigao, Mindanao, in the Baker collection at the U. S. National Museum, which agrees fairly well with Kieffer's descrip-

tion of the genotype, *C. cruciger*, from Butuan, Mindanao and Mt. Makiling, Luzon. It is unfortunate that we lack material of this genus determined by Kieffer, for I believe that it is a composite genus. There are in the Baker collection specimens of Bethylidae bearing determination labels in Kieffer's handwriting of some of the other species described in this 1922 paper, but apparently Kieffer never returned any specimens of *Cladobethylus* to Baker.

The specimen before me agrees with Kieffer's generic description except in a few details. Kieffer says the eyes are bare, but in this specimen the eyes bear short setae—these setae are easily denuded, or Kieffer may have missed them. Kieffer says the scutellum is rounded behind—if he means the posterior margin, it is straight in this specimen, but if he means that the sclerite is convex this specimen agrees. He speaks of the second abdominal tergum as falling away in front—either he uses second here in the true morphological sense, or he is describing a condition which is totally unlike that in this specimen. If he is using second in the true morphological sense, i. e., for the apparent first segment, then his description of the abdomen [" third scarcely longer than second, the three following ones shorter "] almost exactly depicts the condition in this specimen.

I have another male specimen which agrees quite well with the first described species, *C. myrmecophilus* Kieffer. It is generically distinct and is assigned to a new genus, *Colocar*, on a following page. The third species placed originally in this genus, *C. coeruleus* Kieffer, is based on a female. I have no female Amiseginae from the Philippines, so cannot reach any conclusion as to the generic assignment of *coeruleus*. It may be correctly assigned here, or it may belong elsewhere, possibly in *Rohweria*. For the time being I retain *coeruleus* in *Cladobethylus*.

This genus is distinguished at once by the elongate head in which the height is distinctly greater than the width. It has the extremely elongate antennae clothed with long erect setae which also characterize *Colocar* and *Indothrix*, but differs from both of those genera in having an oblique groove across the upper fourth of the mesopleuron, the apical margin of clypeus

thickened, the long, relatively broad, lanceolate stigma, and the costa not produced beyond stigma.

MALE.—Head (fig. 7) with width 0.79 times the height, with somewhat separated, smaller punctures, the frontal concavity weakly rugose, the sides of lower front strongly convergent; mandible as in *Rohweria*; clypeus elongate, the truncate apical margin quite thick, and width of truncation 1.25 times the median length; malar space very long, half the greatest diameter of eye; frontal concavity with a smooth, relatively broad and low median ridge; antennae filiform, rather elongate, probably a bit shorter than body for scape, pedicel and first eight flagellar segments are only three-fourths as long as body, covered with moderately dense, long erect hair; scape as long as pedicel and first flagellar segment combined, the latter half again as long as second segment; the second to eighth (ninth to eleventh missing in my single specimen) flagellar segments subequal in length, the fifth to eighth without basal tubercle and about 3.0 times as long as wide; interocular distance at anterior ocellus half the head width; head from above quadrate, the vertex and upper part of front flat and in the same plane, lower part of front abruptly declivous and perpendicular to upper part; vertex with a low, median polished ridge extending anteriorly to fore ocellus.

Thorax much as in *Rohweria* except as follows: median pronotal length 1.6 times the length of scutum, subequal to combined lengths of scutum and scutellum, and 0.62 times the combined lengths of scutum, scutellum and postscutellum; venation and wing vestiture as in *Rohweria* but stigma very long, lanceolate, the length 2.5 times the greatest width and costa not produced beyond stigma; mesopleural disk not grooved anteriorly, most of discal punctures large and shallow, some of those at upper fourth united into a shallow, oblique groove, above which is a patch of fine, close punctures posteriorly; postscutellum 1.6 times as long as scutellum, the apical margin curved inward on each side of the pair of close-set, acute, subappressed teeth at apex in middle; propodeum with a short dorsal surface in middle which is longitudinally rugose; posterior surface with a few strong ridges radiating outward from abdominal insertion, elsewhere mostly transversely rugulose.

Legs similar to those of *Rohweria*.

First two terga with small, very sparse punctures, vestiture denuded; third and fourth terga with scattered, very long, erect setae.

Included species: 1. *coeruleus* Kieffer, 1922; ♀; Butuan, Mindanao, Philippines.

2. *cruciger* Kieffer, 1922; ♂; Butuan and Surigao on Mindanao, and Mt. Makiling, Luzon, Philippines.

3. *cruciger* var. *antennalis* Kieffer, 1922; Mt. Banahao, Tayabas, Luzon, Philippines.

COLOCAR, new genus

(Figure 22)

Genotype: *Colocar alticola*, new species. By present designation (two included species).

Colocar superficially resembles *Indothrix* among the genera in which males are known. However, the strongly convex pronotum with its abruptly declivous, thickened posterior margin is very reminiscent of *Exova* and *Exopapua* which are known only from females, and it is possible that its real affinities lie with such genera. The presence of long setae on the rather elongate flagellum and similar head ratios cause *Colocar* and *Indothrix* to appear superficially similar, but the former differs notably in the smooth frontal concavity, presence of a delicate pronotal groove and of a carina above at base of hind coxa, and absence of a rather deep median emargination of apical margin of second abdominal sternum.

My interpretation of *myrmecophilus* (Kieffer), the second included species, is based on two male specimens from Basilan and Zamboanga, Mindanao, in the Baker collection in the U. S. National Museum which agree quite well with Kieffer's specific description of the male type from Butuan, Mindanao. Kieffer states that the eyes are bare, whereas my specimens have the eyes with very short, inconspicuous setae. His thoracic measurements (scutum as long as pronotum and scutellum two-thirds as long as scutum) differ somewhat from mine. The specific name, a probable misnomer, was apparently applied because a small ant was "... firmly attached to the ventral surface of abdomen" of Kieffer's type.

MALE.—Head short, the width and height subequal, with shallow, moderately large, scattered or confluent puctures except frontal concavity which is smooth; mandible similar to that of *Rohweria* though more slender; clypeus convex, apex not thickened; malar space well developed, 0.37-0.55 times as long as eye height; frontal concavity without median ridge; antennae fiiliform, rather elongate, 1.1-1.4 times as long as body, covered with moderately dense, long, erect hair; scape as long as pedicel and first flagellar segment combined or as long as the latter alone, the latter a third to a fourth again as long as second segment; flagellar segments beyond first subequal in length, without subbasal tubercle; interocular distance at anterior ocellus 0.43-0.52 times the head width; head from above quad-

rate, the vertex and upper part of front flat and in same plane, lower part of front abruptly declivous and perpendicular to upper part.

Thorax (fig. 22) with small, sparse, moderately shallow punctures or with large, dense ones; in profile the dorsum curved, though with a deep impression between pronotum and scutum; venation and wing vestiture as in *Rohweria*; pronotum with a shallow median groove on posterior third or less, 0.73 times as long as scutum or subequal to it, and 0.37-0.43 times as long as combined lengths of scutum, scutellum and postscutellum, strongly convex, its posterior margin abruptly declivous and thickened; postscutellum in middle terminating in a pair of close, acute, subappressed teeth; dorsal surface of propodeum short, rugose, separated from posterior surface by a weak, arched carina, the latter surface separated from the lateral surfaces by a straight, weak carina.

Legs similar to those of *Indothrix*.

Abdomen as in *Rohweria* but the dorsal punctation relatively sparser.

FEMALE.—Unknown.

Included species: 1. *alticola*, new species; ♂; Mindoro, Philippines.

2. *myrmecophilus* (Kieffer), 1922, new combination (described in *Cladobethylus*); ♂; Butuan, Basilan and Zamboanga, Mindanao, Philippines.

Species studied: those listed above.

Colocar alticola, new species

This species from Mindoro is quite distinct from the species from Mindanao which I believe to be *myrmecophilus* (Kieffer). The punctation of head and dorsum of thorax of the latter is finer and distant, whereas it is coarse and close in *alticola*. The antennae of *alticola* are longer, 1.4 times as long as body as compared to 1.1 times; the malar space is also relatively longer, 0.55 times as long as eye height as compared to 0.37; and the ratio of interocular distance at anterior ocellus to head width is greater, 0.52 as compared to 0.43. In *alticola* the pronotum and scutum are equal in length, while in *myrmecophilus* the pronotum is only three-fourths as long as the scutum. The coloration is also different: *alticola* has the head and thoracic dorsum with dark bronze reflections and the palest parts of the legs are white, whereas *myrmecophilus* lacks metallic reflections and the palest parts of the legs are light testaceous.

Type. ♂; Ilong, Mt. Halcon, Mindoro Is., Philippines; 4500 ft. elev., in mossy forest; May 9, 1954 (M. and D. Townes) [U. S. National Museum, Type No. 63234].

MALE.—Length 3.2 mm., forewing including tegula 3.5 mm. Black, shining; head and thoracic dorsum with dark bronzy reflections; the following dark brown—flagellum, femora and tibiae above narrowly, tarsi, and abdomen except extreme base and laterotergites; the following light brown—fore coxa outwardly, mid and hind tibiae beneath, extreme base of abdomen and laterotergites; the following testaceous—mandible except tip, clypeus, narrow basal annulus on scape, tiny anterolateral spot on pronotal dorsum, hind margin of lateral surface of pronotum and tegula; the following white—inner surface of fore coxa, mid and hind coxae, trochanters, and femora and fore tibia except narrowly above. Wings hyaline, setae dark, moderately dense, suberect. Head and thorax above with moderately dense, fairly short, suberect silvery hair; sides of thorax, abdominal dorsum, femora and tibiae with similar sparser hair; flagellum with erect, light brown hair approximately as long as width of flagellar segments.

Punctures on head moderately large, shallow, subcontiguous; malar space 0.55 times as long as eye height; antennae 1.4 times as long as body, the relative lengths of segments beginning with scape as 20:4:22:17:15:15:15:15:15:15:14:14:17, the intermediate segments about 0.2 times as wide as long; ocelli moderately large, arranged in a small equilateral triangle, the ocellocular distance subequal to lateral diameter of an ocellus, the postocellar distance 1.5 times the ocellocular; interocular distance at anterior ocellus 0.52 times the head width.

Relative lengths of pronotum, scutum, scutellum and postscutellum as 9:9:5:7; pronotum with density and size of punctures as on vertex; scutum, scutellum and median U-shaped postscutellar area with somewhat smaller, closer punctures; median area of postscutellum margined laterally by a narrow, somewhat falciform area with transverse ridges, and laterad of this mostly smooth; mesopleuron with very large, quite shallow, rather separated punctures; fused metapleuron and lateral surface of propodeum smooth except for a few wrinkles posteriorly; dorsal surface of propodeum rugulose, the rugulae toward center more or less longitudinal, those toward sides oblique; posterior surface of propodeum with fine rugulae, those above slightly arched, those below straight and transverse.

Abdomen above with very scattered, minute punctures; second sternum with minute, somewhat closer punctures; third, fourth and fifth sterna with much closer punctures.

FEMALE.—Unknown.

Paratype. ♂; same data as type, but May 11, 1954 [Townes coll.]. The paratype is 3.5 mm. long, and otherwise is almost exactly like the type.

INDOTHRIX, new genus

(Figures 9, 23)

Genotype: *Indothrix longicornis*, new species. Monotypic and by present designation.

This unique genus is known from only the male at present. It is quite distinct from known males of most other genera in the Australasian Series because of the extremely long, filiform antennae, the median emargination of the apical margin of the second sternite and the lack of a basal carina on hind coxa above. Superficially, it resembles such Philippine genera as *Cladobethylus* and *Colocar* in the elongate antennae, but differs from them in the other two characters enumerated above, and also in having the intermediate flagellar segments tuberculate near base. It differs from *Rohweria* in the absence of an oblique groove along anterior margin of the mesopleural disk, the apical margin of clypeus not thickened, and the shorter dorsal area of the propodeum. It is like the Australian *Myrmecomimesis* in general body build, the ecarinate hind coxa and lack of an oblique groove across the upper part of mesopleuron, but differs in the total absence of the median pronotal groove, the somewhat different proportional lengths of the sclerites composing the thoracic dorsum, and the much sparser and finer punctures on abdominal terga.

Male.—Head as figured (fig. 9), the width 1.1 times the height, with coarse, subcontiguous punctures except frontal concavity which is transversely rugose; mandible as in *Rohweria*; clypeus convex, the apical margin not thickened; malar space well developed, 0.28 times as long as eye height; frontal concavity with a weak median ridge; antennae filiform, extremely elongate, 1.3 times as long as body, covered with moderately dense, long erect hair; scape only two-thirds as long as first flagellar segment, the latter subequal to the combined lengths of the next two flagellar segments; flagellar segments beyond the first subequal in length, the fifth to tenth each with a small tubercle beneath near base; interocular distance at anterior ocellus half the head width; vertex rather flat, rounding evenly into the perpendicular front.

Thoracic dorsum (fig. 23) with coarse subcontiguous punctures similar to those on head except scutum with punctation rather shallow; in profile the dorsum curved; venation and wing vestiture as in *Rohweria*; pronotum with median length equal to that of scutum, and 0.45 times as long as combined lengths of scutum, scutellum and postscutellum; mesopleuron

without an oblique groove above; dorsal surface of propodeum almost absent in middle, expanded laterally and with a short, posterolateral, obtuse angulation; posterior propodeal surface with transverse rugulae which extend partly onto lateral surfaces; dorsal and posterior surfaces separated by a carina which is a bit stronger than those on posterior surface, but lateral and posterior surfaces not so separated.

Femora and tibiae with only short, subappressed hairs; hind femur extending nearly to apex of abdomen; hind coxa not carinate above near base.

Abdomen as in *Rohweria* except apical margin of second sternum emarginate in middle.

FEMALE.—Unknown.

Included species: 1. *longicornis*, new species, ♂; Kodaikanal, Pulney Hills, South India.

Species examined: the genotype.

Indothrix longicornis, new species Figs. 9, 23.

Type. ♂; Kodaikanal, Pulney Hills, South India, 6500 ft. elev.; April-May 1953 (P. S. Nathan) [U. S. National Museum, Type No. 63235, by donation from author's collection].

MALE.—Length 4.5 mm., forewing including tegula 4.2 mm. Black and shining; coxae and trochanters very pale yellow, shading into stramineous on femora and all tibiae except hind pair; mandible, tegula, fore and mid tarsi dark red; scape, hind tibia and tarsus brown. Head and thorax with moderately dense, short, suberect, pale brown hair; antennal flagellum with longer, dense, erect, darker brown hair; abdomen and legs with decumbent, short, pale brown hair. Wings entirely pale except for small brown stain anteriorly in marginal cell; setae dark, moderately dense.

Head as figured (fig. 9) and with proportions as described for genus; clypeus with about a dozen moderately large and close punctures; frontal concavity very shallow, with about eight weak transverse ridges interrupted in middle by a weak longitudinal ridge; ocelli moderately large, arranged in a low triangle, the posterior pair separated from inner eye margins by a little less than the diameter of an ocellus, the anterior ocellus depressed in front, and each lateral one depressed on outer edge.

Thorax as figured (fig. 23) and with proportions and sculpture as described for genus; most of metapleuron and lateral surface of propodeum smooth.

First two abdominal terga with scattered small punctures; second sternum similarly punctate, the apical margin with a moderately broad, obtusely angled emargination in middle.

FEMALE.—Unknown.

The African Series

Of the three genera included in this series, *Alieniscus*, *Reidia* and *Obenbergerella*, only *Reidia* is known from both sexes, the others from females alone. The females of the three African genera share the following characters, which in combination separate them from females of the foregoing American and Australasian Series (those characters set in italics are peculiar to the African Series): *malar space without longitudinal groove*; eyes with a few extremely short setulae except in *Obenbergerella* (denuded ?); occipital carina present dorsally and laterally; dorsum of pronotum without median longitudinal groove; *scutum greatly expanded laterally so that vestiges of tegulae and wings, if present, are entirely concealed in dorsal view*; notaulices and parapsidal furrows lacking; mesopleural disk margined anteriorly by a groove; postscutellum very large, covering most of the hind part of thoracic dorsum; posterolateral angles of thoracic dorsum not dentate; posterior surface of propodeum abruptly declivous and perpendicular to thoracic dorsum; *tarsal claws simple* (unknown in *Obenbergerella*); *hind basitarsus as long as or a bit longer than second and third segments combined* (unknown in *Obenbergerella*); *only first two abdominal terga with laterotergites set off by delicate grooves.*

The male of *Reidia* is extremely similar externally to the female, differing only in having the mandible stouter and flattened toward apex.

The African Series of genera is the most highly specialized in the complex, and it is regrettable that several of its members are known from the females alone. The criteria distinguishing these genera are the unusual lateral expansion of the scutum to entirely conceal vestiges of tegulae and wings, the almost complete consolidation of the postscutellum and propodeum, and the simple tarsal claws. There are apparently vestiges of wings beneath the lateral lobes of the scutum, for something having the texture of a wing can be seen in that position in the lateral view of the thorax of *Obenbergerella*, as shown in Figure 20. There are no furrows or sutures separating the postscutellum and propodeum. The extent of the postscutellum is indicated by the presence of a pair of small, close, decumbent teeth in the middle near the apex of the thoracic dorsum.

ALIENISCUS Benoit

(Figures 10, 19, 27, 29)

Alieniscus Benoit, 1951. Bull. et Ann. Soc. Ent. Belgique 87: 91.

Genotype: *Alieniscus Arnoldi* Benoit, 1951. Monotypic and by present designation.

Alieniscus appears to be the most primitive of the three genera comprising the African Series. It resembles most of the Australasian genera in the relatively coarse sculpture, and also in that the propodeum has a definite dorsal surface along the midline. In *Reidia* and *Obenbergerella* the sculpture is in general much more delicate, and the postscutellum extends to the apex of the dorsal thoracic surface along the midline.

Female.—Head as figured (fig. 10), coarsely sculptured; malar space well developed, one-fourth as long as eye height; frontal concavity with a more or less well defined median carina; inner eye margins converging slightly toward vertex, the interocular distance at lower ends of eyes 1.25 times the interocular distance at level of anterior ocellus; antennal scape very elongate, as long as pedicel and first two flagellar segments combined; flagellum elongate-fusiform, the individual segments subcircular in cross section, the fourth to tenth with flattened, sensory areas beneath; vertex feebly convex.

Thorax very coarsely punctured (fig. 19), with sparse, scattered, long, erect black setae arising from umbilicate punctures; pronotum with median length about twice the combined lengths of scutum and scutellum, and twice as long as postscutellum; scutellum in middle at apex with a small, poorly defined scale with a bisinuate posterior margin; mesopleural disk without oblique groove across upper third; posterior surface of propodeum not separated from dorsal surface of thorax by a carina.

Hind leg as figured (fig. 27); hind coxa not carinate at base above; all femora beneath and all tibiae above with scattered, extremely long, erect setae; hind femur extending almost to apex of abdomen; tarsi beneath with two rows of short, close spines.

Abdomen (fig. 29) not strongly flattened, dorsoventral line at base of second tergum three-fourths as long as abdominal width at that point; first tergum with sides evenly rounded to base, top of declivity without feeble groove, and base with a short, longitudinal groove.

Male.—Unknown.

Included species: 1. *arnoldi* Benoit, 1951; ♀; Sawmills, Southern Rhodesia.

2. *mutilloides*, new species; ♀; White Umfolozi River, Zululand.

Species examined: the two listed above.

Alieniscus arnoldi Benoit Figs. 10, 19, 29.

Alieniscus Arnoldi Benoit, 1952. Bull. et Ann. Soc. Ent. Belgique 87: 91 (♀; Sawmills, Southern Rhodesia; type in National Museum of Southern Rhodesia).

I have had the opportunity of studying the unique female type through the courtesy of Dr. George Arnold. The species may be distinguished from its close relative, *A. mutilloides*, new species, by the differences noted in the discussion of that species. Benoit's detailed original description is quite adequate for recognition of the species.

Alieniscus mutilloides*, new species Fig. 27.

This is the "undescribed insect . . . like *Promesitius* . . ." mentioned by Reid (1941, p. 405, and footnote on 409).

The present species, also known from only a single female, is closely related to *arnoldi* Benoit. *A. arnoldi* differs from *mutilloides* by the following combination of characters: lighter red of thorax, legs, scape, pedicel, and first three flagellar segments; frontal concavity with a dozen transverse rugae which are coarser and more separated; scutellum longitudinally to obliquely rugosopunctate; fused metapleuron-propodeum with parallel longitudinal rugae on anterior half, irregularly punctate to rugulosopunctate on posterior half; and dorsum of first tergum and basal half of second tergum with very sparse punctures, the intervals between punctures with close, longitudinal carinae.

Type. ♀; White Umfolozi River, Zululand; November 27, 1922 (R. H. Harris) [British Museum (Natural History)]. The specimen bears three additional data labels, one with the number "1270," the second with "Ac. Z. 525," and the last "Pres. by Imp. Inst. Ent. B. M. 1936-260."

Female.—Length 5.1 mm. Black, the thorax a darker red than in *arnoldi*; mandibles except apices, antennae beneath, fore femora and tibia beneath, light to dark brownish. Dorsum and sides of head, thorax and abdomen, all femora beneath, and all tibiae above with long, scattered, erect black setae, the sides of thorax and legs with short, decumbent silvery pubescence.

Frontal concavity with about 18 transverse rugae which are finer and closer than in *arnoldi*; elsewhere the proportions and sculpture as in

* In allusion to the superficial resemblance of the known species of *Alieniscus* to certain mutillids of slender build.

arnoldi, the vertex and occiput coarsely and closely punctate, the temples more finely punctate, and malar space and head beneath with small, more scattered punctures.

Dorsum of thorax except scutellum coarsely, longitudinally rugosopunctate, the scutellum transversely so; extreme base of propodeum depressed below the level of rest of disk, longitudinally costate, the disk in middle with a small, narrow, barely perceptible scale having a bisinuate apical margin; lateral surface of pronotum and mesopleural disk with coarse, confluent punctures; fused metapleuron-propodeum with about a dozen parallel longitudinal rugae, punctate only narrowly posteriorly.

Dorsum of first tergum, and second tergum with elongate punctures which become denser toward sides where they are separated from each other by less than the width of a puncture, the interspaces very delicately aciculate; extreme apex of second, and third and fourth terga with scattered, small round punctures.

Legs as in *arnoldi*.

MALE.—Unknown.

REIDIA*, new genus

(Figures 11, 15, 30)

Genotype: *Reidia turneri*, new species. Monotypic and by present designation.

Reidia and *Obenbergerella* are more closely related than is either of them to *Alieniscus*. The noteworthy generic differences between them are as follows: frontal concavity with numerous arched carinae in *Obenbergerella* and with fewer, stronger transverse rugae in *Reidia*; apparently the antennal flagellum is differently shaped—that of *Reidia* is rather short fusiform, whereas Bridwell says that of *Obenbergerella* is filiform; the thoracic dorsum punctate in *Obenbergerella*; and postscutellum comparatively shorter in *Reidia*.

FEMALE.—Proportions of head (fig. 11) much as in *Alieniscus*, but scupture much more delicate except in frontal concavity; malar space one-fourth as long as eye height; frontal concavity without a median longitudinal ridge; inner eye margins converging slightly towards vertex, the interocular distance at lower ends of eyes 1.29 times the interocular distance at level of anterior ocellus; antennal scape very elongate, as long as pedicel and first three flagellar segments combined; flagellum shorter and stouter than in *Alieniscus*, rather short fusiform, the individual segments subcircular in cross section, the fourth to tenth with flattened, specialized sensory areas beneath; vertex feebly convex.

* For J. A. Reid, to whom all hymenopterists are indebted for his masterful analysis of the development of the thorax in brachypterous and apterous Hymenoptera.

Thorax (fig. 15) delicately sculptured, the dorsum almost entirely finely and closely lineate; median pronotal length subequal to combined lengths of scutum and scutellum, and about twice as long as postscutellum; postscutellum in middle at apex with a small, weak, bisinuate scale.

Legs similar to those of *Alieniscus*, but long erect hairs absent, and hind femur extending a bit beyond apex of abdomen.

Abdomen (fig. 30) shaped much as in *Alieniscus*, but first tergum with sides straight on basal half, a feeble, impressed line across middle at top of declivity, and a rather elongate, longitudinal groove at base.

MALE.—Externally almost exactly like the female, differing only in that the mandible is stouter and flattened toward apex.

Included species: 1. *turneri*, new species; ♀ ♂; Port St. John, Pondoland.

Species examined: the genotype.

Reidia turneri*, new species Figs. 11, 15, 30.

This is the series of undescribed specimens from Pondoland mentioned by Reid (1941, footnote on p. 409).

Type. ♀; Port St. John, Pondoland, South Africa; December 1923 (R. E. Turner) [British Museum (Natural History)].

FEMALE.—Length 2.9 mm. Head black with some feeble dark blue reflections; thorax, legs and abdomen light reddish brown; mandible, scape, pedicel and first flagellar segment testaceous. Temples with moderately dense, appressed silvery hair; head elsewhere and thorax virtually bare; legs with very short, appressed hair but no long erect setae; abdomen with scattered, short, appressed setae which become somewhat closer on third and fourth terga.

Head shining, the proportions as detailed in generic description; frontal concavity rather irregularly, transversely rugose; area laterad of anterior ocellus deeply and contiguously pitted; top of head with moderately large, shallow punctures separated by less than the diameter of a puncture in the ocellar triangle, smaller and more separated on vertex; ocelli in a large equilateral triangle, the posterior pair separated from occipital carina by 1.5 times the postocellar distance.

Proportions and sculpture of thoracic dorsum as indicated in generic diagnosis; pronotal dorsum in addition with a few, scattered small punctures; mesopleuron above longitudinally rugulose, below with a few scattered punctures; metapleuron longitudinally rugulose; lateral surface of propodeum smooth, the posterior surface with more separated, longitudinal lineations than dorsum and with scattered small punctures.

Lateral surface of all coxae closely lineate; tarsi beneath with two rows of short, close spines.

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* For Rowland E. Turner, collector of the type series.

Abdomen shining, declivity of first tergum with close, arched lineations and sparse punctures; remainder of first tergum and second to fourth terga with fine punctures which are rather scattered on first two terga, and closer on third and fourth; apical half of first tergum and all of second with vestiges here and there of the aciculations which characterize the rest of the type series.

Allotype. ♂; same data as type, but January 29-February 5, 1924 [BM].

MALE.—Length 3.3 mm. Color and sculpture as in type except mandible stouter and flattened toward apex, and first and second terga rather dull, apical half of first and all of second closely and longitudinally aciculate.

Paratypes. 1 ♀; same data as type but January 1924. 1 ♂; same data as type [USNM]. The paratypes are 3.3 and 2.8 mm. long respectively. They agree with the above description of the type but the abdominal sculpture is as in the allotype.

OBENBERGERELLA Strand

(Figures 12, 20)

Alienus Bridwell, 1919. Proc. Hawaii. Ent. Soc. 4: 117. Preoccupied by Handlirsch, 1906.

Genotype: *Alienus aenigmaticus* Bridwell, 1919. Monotypic and by present designation.

Obenbergerella Strand, 1929. Acta Univ. Latviensis 20: 25. New name.

FEMALE.—Head (fig. 12) with sculpture very delicate except in frontal concavity; malar space one-fourth as long as eye height; frontal concavity with close, arched carinae, and a low median ridge; inner eye margins converging strongly towards vertex, the interocular distance at lower ends of eyes 1.53 times the interocular distance at level of anterior ocellus; antennae now missing, but Bridwell states that scape reaches almost to anterior ocellus, is as long as pedicel and first three flagellar segments combined, and that the flagellum is filiform; eyes bare; vertex with a shallow concavity in middle.

Thorax (fig. 20) delicately sculptured, the dorsum with fine shagreening and quite scattered small punctures; vestiges of wings visible beneath lateral lobe of scutum when thorax is viewed from side; median pronotal length a bit longer than combined lengths of scutum and scutellum, and 1.3 times as long as postscutellum; postscutellum with its posterior margin marked by a weak carina at apex of dorsal surface of thorax, the carina with a pair of very weak, decumbent teeth in middle.

Legs now missing except for fore femur and tibia on one side, but apparently similar to those of *Reidia*, i.e., without long scattered setae on femora and tibia.

Abdomen shaped much as in *Alieniscus*; first tergum with a feeble transverse impressed line across middle at top of declivity, and with a short longitudinal groove at base.

MALE.—Unknown.

There are several misinterpretations or ambiguities in the original description which require correction or clarification. The legs are stated to be "not at all spinose." These are now almost entirely missing, but I interpret this statement as meaning that a fore tarsal comb is absent, that the femora and tibiae lack the long, scattered setae found in *Alieniscus*, but that the rows of minute spines on the tarsi beneath are not necessarily lacking. The hind trochanters are stated to be "two jointed." I feel most certain that this is a misinterpretation, and that the short, slender basal portion of the hind femur was taken to be the second segment of the trochanter—my explanation is borne out by the appearance of this part of the leg in other genera. The tibial calcaria are stated to be "feeble, 1, 2, 1." I believe that there is probably a vestigial shorter spur on the hind tibia which was overlooked due to its minute size, and that the formula actually should be 1-2-2 as in all other Amiseginae. The condition of the tarsal claws, i.e., simple or with an inner tooth, is not stated, but I would expect the claws to be simple as in the other African Amiseginae.

Included species: 1. *aenigmaticus* (Bridwell), 1919; ♀; Mowbray Golf Links, Cape Town, South Africa.

Species examined: the genotype.

ADELPHINAE

This subfamily contains only two neotropical genera, *Adelphe* Mocsáry and *Nesogyne*, n. g. It has been placed systematically between the Amiseginae and Cleptinae, though it is obviously much closer to the former subfamily. Both Mocsáry and Ducke treated it as a discrete subfamily, but only the latter author was acquainted with representatives of all three subfamilies. Ashmead (1902), on the basis of the original descriptions alone, thought that *Adelphe* should be placed in the Cleptinae, and that

Peseudepyris Ducke, now recognized as a synonym of *Adelphe*, should be placed in the Allocoeliinae.

The Adelphinae agree in most characters with the preceding diagnosis of the Amiseginae, but there are several important differences which appear to be of subfamilial value as follows: the lateral surface of pronotum in Adelphinae has a marginal groove above, which is lacking in Amiseginae; the posterolateral pronotal lobes touch the tegulae in the former but are separated from the tegulae in the latter group; the mid coxae are narrowly separated in Adelphinae, contiguous in Amiseginae; in the females of Adelphinae the tarsal segments beneath have moderately dense, suberect bristles, while in the Amiseginae they have two rows of tiny spines; in the males of *Adelphe* (those of *Nesogyne* unknown) the mandible is a relatively huge, flattened, foliaceous structure with one or two small acute teeth at tip, while in the Amiseginae the mandible is much less developed though it is more robust, broader and flattened on one or two sides as contrasted with the slender, subulate mandible of females.

The Adelphinae are much more closely related to the American Series of the Amiseginae than to either of the other main groups of Amiseginae, and are probably a sidewise specialization derived from the American stock, and not in the main line of descent of the Australasian and African Series of the Amiseginae. They differ from genera of the American Series in having the lower part of front flat, the occipital carina well developed at least dorsally, and the propodeal dorsum armed with a strong posterolateral tooth, spur or angulation.

Unfortunately nothing is known as to the host relationships of the Adelphinae. It seems rather probable that eventually they will be found to be egg parasites as are the Amiseginae, rather than larval parasites as are the Cleptinae.

Members of the Adelphinae have been found only in the New World where they are known from eastern Peru, Brazil, Panama, Costa Rica, Mexico, Florida and Hispaniola.

ADELPHE Mocsáry

(Figures 3, 25, 35)

Adelphe Mocsáry, 1890. Termesz. Fuzetek 13: 46.

Genotype: *Adelphe mexicana* Mocsáry, 1890. Monotypic and by designation of Ashmead, 1902.

Pseudepyris Ducke, 1902. Ztschr. Hym. Dipt. 2: 204.

Genotype: *Pseudepyris paradoxa* Ducke, 1902. Monotypic and by designation of Bodenstein, 1939.

Adelpha Schulz, 1906. Spolia Hym., p. 153. Proposed unnecessarily for *Adelphe* Mocsáry. Preoccupied by Hübner, 1819.

Parachrysis Kieffer, 1910. Ann. Soc. Ent. France 78: 287. Preoccupied by Gribodo, 1879.

Genotype: *Parachrysis metallica* Kieffer, 1910. Monotypic and by present designation.

Ducke is responsible for the synonymy as given above. In 1911, after studying the genotype of *Adelphe*, he published his conclusions that *Pseudepyris* was a synonym. He recognized further at that time that *metallica* Kieffer, the genotype of *Parachrysis*, was identical with *flavipes* (Ducke), a species which he considered to be conspecific with *paradoxa*.

The genus has not been recorded previously from America north of Mexico, and it is of interest to note here that a specimen of *Adelphe* in the U. S. National Museum collection was taken at Royal Palm Hammock (now known as Collier-Seminole State Park), Collier County, Florida. Unfortunately, though apparently an undescribed species, it is in undescribable condition. It is a teratological specimen, the left side of the head deformed, presumably from an injury during the pupal state. The specimen was recovered from the stomach of a toad, *Bufo* species, and consists of various fragments mounted on a card point with the legs, antennae and wings lacking. It is unquestionably a specimen of *Adelphe*.

Adelphe is distinguished from *Nesogyne* by a number of characters as listed in the discussion of that genus.

Female and male.—Head (fig. 3) moderately to coarsely sculptured, the width subequal to prothoracic width just before the tegulae; malar space well developed, 0.4-0.5 times as long as eye height; eyes strongly bulging and with dense, moderately long, erect setae; labrum rudimentary, concealed beneath clypeus, apical margin rounded; mandible of female slender, more or less circular in cross section, and tapering to an acute

tip, of male a relatively huge, flattened, foliaceous structure with one or two small acute teeth at tip; clypeus narrow, transverse, apical margin thickened and rounded; antennal flagellum in female very short fusiform (fig. 3a), the segments beyond first broader than long and strongly flattened beneath, scape relatively elongate and as long as pedicel and first three flagellar segments, pedicel half as long as first flagellar segment; flagellum in male more elongate, the segments beyond first from 1.5 to 2 times longer than broad and not flattened beneath, scape as long as first two flagellar segments, pedicel a third as long as first flagellar segment; lower half or two-thirds of front transversely rugose or with some coarse punctures arranged in transverse rows; upper part of front convex and without a median groove; ocelli normal in size, moderately separated, the posterior pair narrowly separated from inner eye margins; interocular distance at anterior ocellus 0.35-0.55 times as great as head width; occipital carina moderately to strongly developed, complete and separated beneath from hypostomal carina, margined anteriorly above by a foveate groove; head beneath flat in front of occipital carina, concave behind it.

Thorax (fig. 25) more finely sculptured than front, rather narrow, about twice as long as broad; pronotum large, the dorsal surface more or less quadrate, margined by a furrow anteriorly and laterally, slightly longer (1.1-1.2) than scutum; scutum with notaulices and parapsidal furrows present, 1.0-1.5 times longer than scutellum and postscutellum combined; postscutellum transverse, a little broader than in *Amisega*; mesopleuron with an oblique, shallow groove across upper third; median length of dorsal surface of propodeum (measured to posterior ridge) subequal to or a bit shorter than scutellum; dorsal, lateral and posterior surfaces of propodeum separated from each other by ridges; posterolateral angles of dorsal surface of propodeum obtusely angulate or with a blunt tooth.

Fully winged, tegulae well developed; venation as figured (fig. 35), transverse median and basal veins of forewing interstitial in female, the former meeting radial vein beyond origin of basal vein in male; hind wing without anal lobe; wing membrane clothed with moderately dense, suberect setae.

Legs as in *Amisega*, but with rather abundant, long erect setae; hind coxa carinate above on inner margin, the carina expanded into a small lamella at base; trochanters one-segmented; hind femur abruptly narrowed near base; tibial spurs 1-2-2, the shorter spur of hind tibia quite small; fore tarsus without comb; tarsi with rather dense suberect setae beneath, the two rows of tiny spines absent; tarsal claws with an erect inner tooth.

Abdomen short, relatively broad, moderately flattened above, the venter convex, with four visible segments in female, five in male; first and second segments very large, constituting about four-fifths of the entire length; first four terga with distinct laterotergites; first sternum with a well-developed, rounded median keel on basal half; apical retracted segments in female extremely elongate, each telescoped within the preceding.

Included species: 1. *flavipes* (Ducke), 1903 (=*metallica* (Kieffer), 1910); ♂; Belem and Itaituba in Para, and Teffé in Amazonas, Brazil.

2. *mexicana* Mocsáry, 1890; ♂; Orizaba, Vera Cruz, Mexico.

3. *paradoxa* (Ducke), 1902; ♀ ♂; Amazonia from the Atlantic Ocean to eastern Peru.

Species examined: four unidentified (and apparently mostly undescribed) species from Brazil, Peru, Panama and Costa Rica, and Florida.

NESOGYNE, new genus

(Figure 33)

Genotype: *Nesogyne taino*, new species. Monotypic and by present designation.

Nesogyne is quite distinct from its only close relative, *Adelphe* Mocsáry, in a number of characters as follows: almost entirely smooth integument of head and thorax; very broad, low ocellar triangle; occipital carina present only dorsally; pronotal disk anteriorly not margined by a furrow; brachypterous; postero-lateral propodeal angle prolonged into a slender digitate process; and third and fourth abdominal segments 0.8 times as long as first and second. The male of *Nesogyne* is unknown. It is presumed that superficially it may be rather similar to males of *Adelphe* in having fully developed wings.

Female.—Head with integument almost entirely smooth, the width 1.1 times the prothoracic width just before tegulae; mandible, labrum and clypeus as in *Adelphe* females; malar space elongate, about two-thirds as long as eye height; eyes strongly protuberant and with short erect setae; antennal flagellum as in female *Adelphe*, but pedicel three-fourths as long as first flagellar segment; lower front with a shallow median groove extending a third of the distance to anterior ocellus; upper part of front and vertex with a very few minute punctures; ocelli tiny, in a broad flat triangle, the postocellar line 0.6 times the interocular distance at that level, the posterior ocelli separated from inner eye margins by about twice the diameter of an ocellus; interocular distance at anterior ocellus half the head width; occipital carina weak as compared to *Adelphe*, present only dorsally.

Thorax with integument almost entirely smooth, the dorsum with a very few minute punctures; pronotum large, the dorsum more or less

quadrate, anteriorly abruptly declivous to the continuous gutter which margins the extreme anterior part of the notum and the lower margin of the lateral surface; the disk of pronotum otherwise without an anterior furrow, the lateral surface above with a furrow which becomes weaker anteriorly; pronotum 1.4 times as long as scutum; the latter with notaulices and parapsidal furrows present and 1.3 times as long as scutellum and postscutellum combined; postscutellum as in *Adelphe*; median length of dorsal surface of propodeum (measured to posterior ridge) a bit longer than scutellum; mesopleuron as in *Adelphe*; dorsal, lateral and posterior surfaces of propodeum separated from each other by ridges, that separating the dorsal and posterior surfaces much stronger than others; posterolateral angle of dorsal surface of propodeum with a long, slender, digitate process.

Brachypterous, wings narrow, forewing as figured (fig. 33), extending a bit beyond dorsal surface of propodeum, hind wing extending almost to end of propodeal dorsum; forewing with only a few, scattered, erect setae.

Legs as in *Adelphe*, but with the erect setae sparser and dorsal carina of hind coxa not lamellate at base.

Abdomen as in *Adelphe* but third and fourth segments 0.8 times as long as first and second, laterotergites present on first three terga and vestiture sparser.

MALE.—Unknown.

Included species: 1. *taino*, new species; ♀; Dominican Republic.

Species examined: the genotype.

Nesogyne taino*, new species Fig. 33.

Type. Valle Nuevo, S. E. Constanza, Dominican Republic; about 7000 ft. elev.; August 1938 (P. J. Darlington) [Museum of Comparative Zoology].

FEMALE.—Length 3.1 mm., forewing including tegula 0.9 mm. Shining, brown; head and middle of thorax almost black; pronotum and propodeum castaneous; abdomen and legs much lighter; scape, pedicel and first two flagellar segments testaceous, rest of antenna dark brown. Vestiture very sparse, erect, rather long, brown. Wings moderately infumated.

Head as detailed in the generic diagnosis; ratio of scape, pedicel and first three flagellar segments as 27:8:10:4:4; erect setae on top of head very sparse, almost as long as antennal pedicel.

Thorax as described for genus; erect setae very sparse and as long as those on head; tegula normal in size; mesopleuron with a groove along anterior margin; propodeal dorsum with a low median ridge on either side of which is a narrowly separated, weaker ridge on basal half; ridge

* An Indian tribe inhabiting Hispaniola in 1492.

between dorsal and posterior propodeal surface sharp, higher at midline than on sides; posterolateral digitate process half as long as first flagellar segment of antenna; posterior propodeal surface with five narrow, weak ridges radiating upward from the broad abdominal insertion, one along midline, one on each side, and an intermediate one which is closer to lateral than to median ridge, and also a weak arcuate ridge a short distance above abdominal insertion.

Legs and wings as described for genus.

Abdomen as in generic diagnosis; terga with very sparse, long, erect setae, those of first and second terga scattered, those on third and fourth located more posterolaterally and posteriorly.

MALE.—Unknown.

REFERENCES

ASHMEAD, W. H., 1902. Family XXXI, Chrysididae *in* Classification of the Fossorial, Predaceous and Parasitic Wasps, or the Superfamily Vespoidea. Canad. Ent. 34: 221-231.

BENOIT, P. L. G., 1951. Alieniscidae nomen novum pro Alienidae Bridwell. Bull. et Ann. Soc. Ent. Belg. 87: 90-92.

BRIDWELL, J. C., 1919. Alienidae *in* Miscellaneous Notes on Hymenoptera with Descriptions of New Genera and Species. Proc. Hawaii. Ent. Soc. 4: 117-119.

BRUES, C. T. AND A. L. MELANDER, 1932. Alienidae *in* Classification of Insects. Bull. Mus. Comp. Zool. 73: 25, 488, 501.

CAMERON, P., 1888 [1883-1900]. *Amisega in* Hymenoptera, Families Tenthredinidae to Chrysididae. Biol. Centr.-Amer., Ins., Hym. 1: 457-458, pl. 20, figs. 2, 2 a.

COSTA LIMA, A. DA, 1936. Sur un nouveau chryside: *Duckeia cyanea*, parasite des oeufs de phasmide. Livre Jubilaire E. L. Bouvier, pp. 173-175, 6 figs.

DUCKE, A., 1902. Ein wenig bekanntes Chrysididen genus *Amisega* Cam. Ztschr. Hym. Dipt. 2: 141-144.

————, 1902. Neue Goldwespen von Pará. *Op. cit.* 2: 204-207.

————, 1903. Amiseginae and Pseudepyrinae *in* Neue südamerikanische Chrysididen. *Op. cit.* 3: 129-133.

————, 1911. *Amisega* and *Adelphe in* Terzo supplemento all revisione dei Crisididi dello stato brasiliano del Para. Bull. Soc. Ent. Ital. 41: 93-94.

ESSIG, E. O., 1942. Alienidae *in* College Entomology, p. 650.

FOUTS, R. M., 1925. *Rohweria in* Descriptions of Three New Hymenoptera from the Philippine Islands. Phil. Jour. Sci. 26: 515-517, 2 figs.

GHESQUIÈRE, J., 1951. Synonymies nouvelles pour la famille des Obenbergerellidae. Bull. Ann. Soc. Ent. Belg. 87: 238-241.

GRANDI, G., 1943. Morfologia ed etologia comparate di insetti a regime specializzato. XVIII. La morfologia addominae dei Crisididi e dei Cleptidi. Mem. R. Accad. Sci. Inst. Bologna (9) 10: 49-58, 2 pls.

GÜNTHER, K., 1953. Über die taxonomische Gliederung und die geographische Verbreitung der Insektenordnung der Phasmatodea. Beitr. z. Ent. 3: 541-563, 4 figs.

KIEFFER, J. J., 1905. *Promesitius in* Description de nouveaux proctotrypides exotiques. Ann. Soc. Sci. Bruxelles 29: 123-124.

————, 1907. *Promesitius in* Beschreibung neuer im Naturhistorischen British Museum zu London aufbewahrter Proctotrypiden. Berlin. Ent. Ztschr. 51: 290-292.

————, 1910. *Parachrysis in* Description de nouveau microhyménoptères du Brésil. Ann. Soc. Ent. France 78: 287-288.

————, 1914. Bethylidae. Das Tierreich, Lief. 41, 595 pp., 205 figs.

————, 1922. *Cladobethylus in* Philippine Serphidae (Proctotrupidae). Phil. Jour. Sci. 20: 67-71.

MILLIRON, H. E., 1950. The Identity of a Cleptid Egg Parasite of the Common Walking Stick, *Diapheromera femorata* Say. Proc. Ent. Soc. Wash. 52: 47.

MOCSÁRY, A., 1889. Amiseginae *in* Chrysididarum orbis terrarum universi, pp. 34-35.

————, 1890. Adelphinae *in* Additamentum primum ad monographium Chrysididarum orbis terrarum universi. Termesz. Füzetek 13: 45-46.

REID, J. A., 1941. The Thorax of the Wingless and Short-winged Hymenoptera. Trans. Roy. Ent. Soc. London 91: 367-446, 81 figs.

RIEK, E. F., 1955. Australian Cleptid Egg Parasites of Cresmododea. Austral. Jour. Zool. 3: 118-130, 7 figs.

SCHULZ, W. A., 1906. *Adelpha in* Spolia Hymenopterologica, p. 153.

STRAND, E., 1929. *Obenbergerella in* Zoological and Palaeontological Nomenclatorial Notes. Acta Univ. Latviensis 20: 25.

WALKER, F., 1866. Characters of a New Genus and Species of Chalcidites. Trans. Ent. Soc. London (3) 2: 441.

Explanation of Figures

(All illustrations by Arthur D. Cushman)

Plate XIX

Fig. 1.—*Amisega cooperi*, new species. Female allotype (Costa Rica). Frontal view of head. (X 12.)

Fig. 2.—*Duckeia cyanea* Costa Lima. Female paratype (Brazil). Frontal view of head. (X 16.)

Fig. 3.—*Adelphe* species. Male (Costa Rica). Frontal view of head. Fig. 3 a.—*Idem*. Female (Costa Rica). Antennal flagellum. (Both X 15.)

Fig. 4.—*Mesitiopterus kahlii* Ashmead. Female (Minnesota). Mandible. Fig. 4 a.—*Idem*. Male (Minnesota). Mandible. (Both X 41.)

Fig. 5.—*Myrmecomimesis nigricans* (Walker). Female (Australia). Frontal view of head. (X 15.)

Fig. 6.—*Exopapua nupela*, new species. Female paratype (New Guinea). Frontal view of head. (X 18.)

Fig. 7.—*Cladobethylus cruciger* Kieffer. Male (Mindanao). Frontal view of head. (X 20.)

Fig. 8.—*Rohweria azurea*, new species. Male paratype (Mindanao). Frontal view of head. (X 12.)

Fig. 9.—*Indothrix longicornis*, new species. Male type (South India). Frontal view of head. (X 19.)

Fig. 10.—*Alieniscus arnoldi* Benoit. Female type (Southern Rhodesia). Frontal view of head. Fig. 10 a.—*Idem*. Head in profile. (Both X 15.)

Fig. 11.—*Reidia turneri*, new species. Female type (Pondoland, South Africa). Frontal view of head. (X 23.)

Fig. 12.—*Obenbergerella aenigmatica* (Bridwell). Female type (Capetown, South Africa). Frontal view of head. (X 26.)

Plate XX

Fig. 13.—*Amisega cooperi*, new species. Female allotype (Costa Rica). Lateral view of thorax, wings omitted. Fig. 13 a.—*Idem*. Dorsal view of thorax, wings omitted. (Both X 12.)

Fig. 14.—*Duckeia cyanea* Costa Lima. Female paratype (Brazil). Dorsal view of thorax, wings omitted. (X 16.)

Fig. 15.—*Reidia turneri*, new species. Female type (Pondoland, South Africa). Dorsal view of thorax. (X 23.)

Fig. 16.—*Myrmecomimesis nigricans* (Walker). Female (Australia). Dorsal view of thorax. (X 15.)

Fig. 17.—*Exova tetraspina* Riek. Female paratype (Australia). Dorsal view of thorax. (X 20.)

Fig. 18.—*Exopapua nupela*, new species. Female paratype (New Guinea). Lateral view of thorax. Fig. 18 a.—*Idem*. Dorsal view of thorax. (Both X 18.)

Fig. 19.—*Alieniscus arnoldi* Benoit. Female type (Southern Rhodesia). Lateral view of thorax. Fig. 19 a.—*Idem*. Dorsal view of thorax. (Both X 15.)

Fig. 20.—*Obenbergerella aenigmatica* (Bridwell). Female type (Capetown, South Africa). Lateral view of thorax. Fig. 20 a.—*Idem*. Dorsal view of thorax. (Both X 26.)

PLATE XXI

Fig. 21.—*Myrmecomimesis rubrifemur* (Riek). Male paratype (Australia). Dorsal view of thorax, pronotum and wings omitted. (X 15.)

Fig. 22.—*Colocar myrmecophilus* (Kieffer). Male (Mindanao). Dorsal view of thorax, wings omitted. (X 30).

Fig. 23.—*Indothrix longicornis*, new species. Male type (South India). Dorsal view of thorax, wings omitted. (X 19.)

Fig. 24.—*Atopogyne lineata*, new species. Female type (Borneo). Dorsal view of thorax, wings omitted. (X 11.)

Fig. 25.—*Adelphe* species. Male (Costa Rica). Dorsal view of thorax, wings omitted. (X 15.)

Fig. 26.—*Exopapua nupela*, new species. Female paratype (New Guinea). Hind leg, lateral view. (X 21.) Fig. 26 a.—*Idem*. Tarsal claws of hind leg. (X 47.)

Fig. 27.—*Alieniscus mutilloides*, new species. Female type (Zululand, South Africa). Hind leg, lateral view. (X 18.) Fig. 27 a.—*Idem*. Tarsal claws of hind leg. (X 40.)

Fig. 28.—*Exopapua nupela*, new species. Female paratype (New Guinea). Dorsum of abdomen. (X 18.)

Fig. 29.—*Alieniscus arnoldi* Benoit. Female type (Southern Rhodesia). Dorsum of abdomen. (X 15.)

Fig. 30.—*Reidia turneri*, new species. Female type (Pondoland, South Africa). Dorsum of abdomen. (X 23.)

Fig. 31.—*Amisega cooperi*, new species. Female allotype (Costa Rica). Dorsum of abdomen. (X 12.)

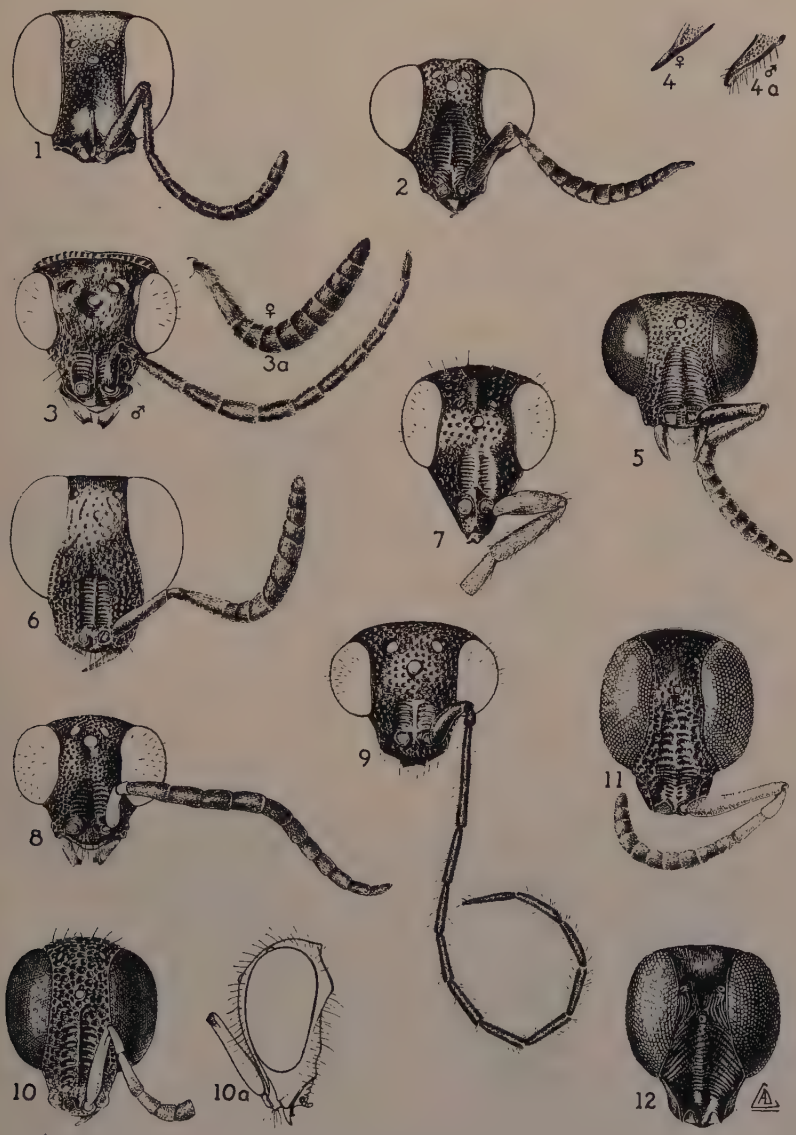
PLATE XXII

Fig. 32.—*Amisega cooperi*, new species. Female allotype (Costa Rica). Forewing. Fig. 32 a.—*Idem*. Hind wing. (Both X 22.)

Fig. 33.—*Nesogyne taino*, new species. Female type (Dominican Republic). Forewing. (X 78.)

Fig. 34.—*Atopogyne lineata*, new species. Female type (Borneo). Forewing. (X 16.)

Fig. 35.—*Adelphe* species. Male (Costa Rica). Forewing. (X 23.)



KROMBEIN: REVIEW OF AMISEGINAE

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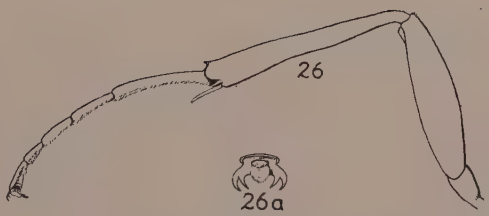
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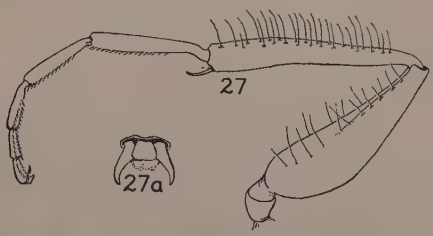
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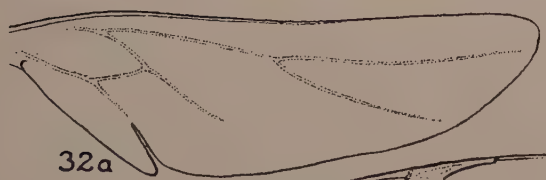

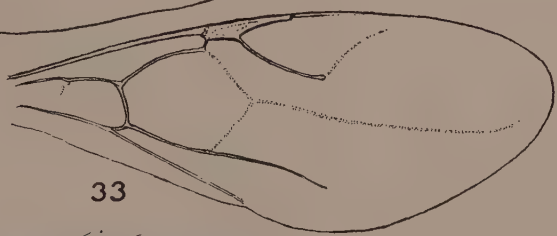

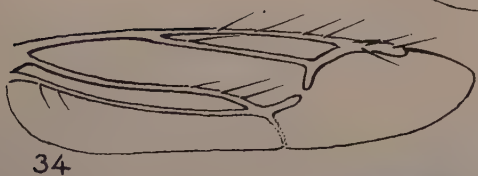

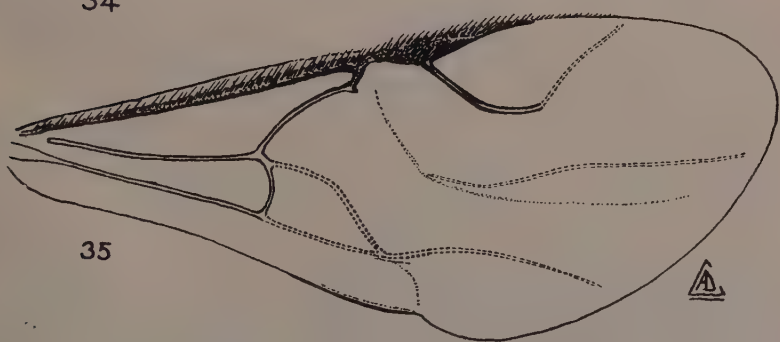

KROMBEIN: REVIEW OF AMISEGINAE

A REVIEW OF THE GENUS NEOTETTIX (ORTHOPTERA; ACRIDOIDEA; TETRIGIDAE)

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The present study is the sixth of the collateral papers made necessary by studies on the Orthoptera of North America preparatory to the production of the monograph on the same, which is being sponsored by the National Science Foundation.[1] The general outline of this work, and acknowledgments of the vital cooperation and assistance we have received from a number of other institutions and agencies have already been presented.

The genus treated in the present study is entirely Nearctic in distribution and has no close relatives in the Old World. In its study we have examined in excess of twenty-six hundred specimens, including the types of the three forms of the genus here recognized, as well as the single types (holotypes or lectotypes) on which four names here regarded as synonyms were based, as well as paratypes or topotypic material representing four additional synonymic names.

NEOTETTIX Hancock

1898. *Neotettix* Hancock, Entom. News, IX, p. 138.
1918. *Cavotettix* Hancock, Entom. News, XXIX, p. 343 (Genotype by original designation, *Cavotettix nullisinus* Hancock.)

Genotype (by original designation) "*Tettix femoratus* Bolívar (not *Tettix femoratus* Scudder)." Hancock regarded Bolívar's interpretation as representing a different species from Scudder's *femoratus*, and to the former he applied the new name *bolivari*. However, *bolivari*, on the basis of its type, is inseparable from *femoratus* Scudder, which thus is, in fact, the genotype.

[1] "The North American Tetrigid Genus Nomotettix;" Proc. Acad. Nat. Sci. Phila., CVII, pp. 1-34, 1 map, pls. I-III (1955). "Tetrix subulata as Occurring in North America;" ib., pp. 145-165, 2 maps (1955). "On Tetrix brunneri and a New Species of Tetrix from California;" Proc. Acad. Nat. Sci. Phila., CVIII, pp. 97-115, 2 maps (1596). "The Components of Tetrix ornata"; Trans. Amer. Entom. Soc., LXXXII, pp. 117-145, 1 map (1956).

The synonymy of *Cavotettix* was established by Hebard in 1919,[2] and is fully supported by the evidence before us.

When Hancock erected the genus he contrasted it with *Nomotettix, Tetrix* and *Paratettix,* but his key there presented for the separation of these genera is without value in that it fails to give consideration to the plasticity found in extra-limital species of *Tetrix.* In his later treatment in the "Genera Insectorum"[3] he placed *Neotettix* in the vicinity of the Mexican and Central American genus *Ochetotettix* Morse. It is evident to us that *Ochetotettix* Morse,[4] and much more distantly the South American genus *Liotettix* I. Bolívar,[5] both of which are before us, are nearer to *Neotettix* than any other genera known at this time, and of these two *Ochetotettix* is clearly the nearer relative. From *Ochetotettix* of which but a single species—*barretti*—is known at present,[6] and which was originally described as a *Neotettix,* the present genus differs in the following features:[7]

Median carina of fastigium as seen in profile less markedly produced dorso-cephalad; cephalic border of fastigium as seen from dorsum subtruncate to arcuato-truncate in outline and little produced cephalad of the eyes; facial profile as a whole low arcuate from the fastigio-facial angle to the median ocellus. Profile of pronotum in the brachypronotal condition without a distinct prehumeral hump, more evenly arcuate. Tegmina smaller, in the macropronotal condition with their length not equal to that of the median femora. Median femora with ventro-external margin never truly lobate .....*Neotettix*

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[2] Entom. News, XXX, p. 78.

[3] Orthoptera, Fam. Acridiidae, Subfam. Tetriginae (fasc. 48), p. 61 (1906).

[4] Biol. Centr.-Amer., Orth., II, p. 9 (1900). Genotype (by designation of Kirby, Syn. Catal. Orth., III, p. 50 (1910)).—*O. barretti* (Hancock).

[5] Boletín Soc. Españ. Hist. Nat., VI, p. 393 (1906) (To replace *Prototettix* I. Bolívar, 1887, not of Giebel, 1856). Hanock's *Rytinatettix*, of 1909, is a direct synonym of *Liotettix*, as has been shown by Rehn (Grasshoppers and Locusts of Australia, I, p. 150, footnote 213 (1952)).

[6] Hebard, in 1923 (Trans. Amer. Entom. Soc., L, p. 90), showed that Morse's *O. volans* was based on the macropronotal condition of *O. barretti*, the type of which latter and paratypes of *volans* are now before us in the Academy series.

[7] Almost all the features given by Hancock to distinguish the two genera (Genera Insectorum, Orthoptera, Fam. Acridiidae, Subfam. Tetriginae (fasc. 48), p. 52 (1909)) are without value for that purpose, as the more recently described neotenic species of *Neotettix* negative most of those there given as characteristic of *Ochetotettix*.

Median carina of fastigium as seen in profile more markedly produced dorso-cephalad; cephalic border of fastigium as seen from dorsum more broadly arcuate produced cephalad of the eyes; facial profile virtually straight from the narrowly rounded fastigio-facial angle to the median ocellus. Profile of pronotum in the brachypronotal condition with a moderately distinct prehumeral hump. Tegmina larger, in the macropronotal condition with their length equalling, if not exceeding, that of the median femora. Median femora with ventro-external margin distinctly lobate.
Ochetotettix

The most important study dealing with *Neotettix* produced in the last forty years is the section on the genus in Rehn and Hebard's study of the "Dermaptera and Orthoptera of the Coastal Plain and Piedmont Region of the Southeastern United States."[8] While those authors then regarded "bolteri" as a recognizable species, a course which we, with far richer and much more comprehensive material, find is not warranted or possible, they then established synonymy which greatly simplified a badly tangled situation, and also demonstrated the presence of a neotenic species not only in the genus, but in the Nearctic tetrigid fauna.

As a summary of the characters of the genus will shortly appear in the definitive monograph, it is unnecessary to present one here. The above comparison with *Ochetotettix* shows the individualities of the two genera, which, however, are closely related.

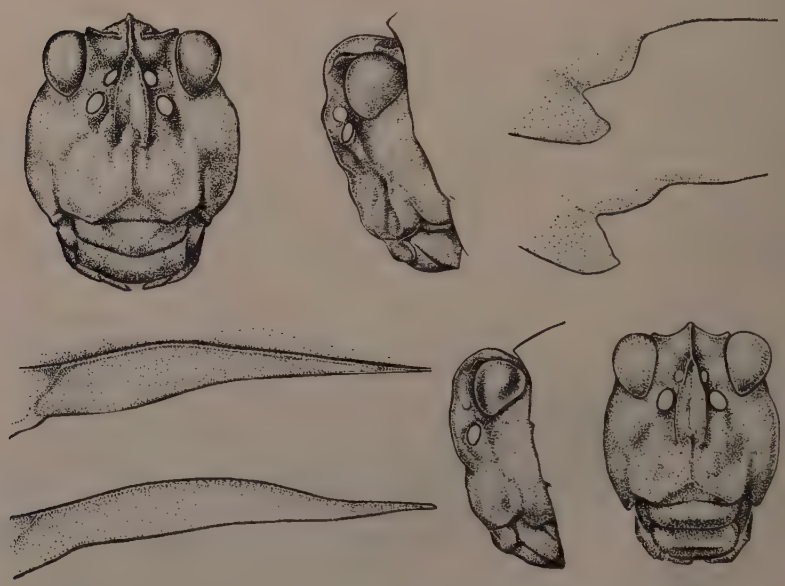
Distribution.—Eastern, southeastern and southern United States extending as far north as Staten Island, New York, north-central New Jersey, southeastern Pennsylvania, southern Ohio, Indiana, Illinois and Missouri, westward to eastern Oklahoma and eastern Texas, also in the coastal belt of Texas to the extreme southern point (Brownsville). In Florida it extends southward to the Keys.

Key to the Species of Neotettix

1. Pronotal profile not strongly arcuate nor sublamellate, median carina well marked but sometimes undulate, and pronotal surface varying in sculpture from a granulose to a strumose type; lateral lobes of pronotum with caudal margin, as usual, bisinuate; scapular area of pronotum never as deep proximad as in alternate category. Tegmina larger, and entirely exposed. (Atlantic, southeastern and Central States, west to Texas and Oklahoma.) .....*femoratus* (Scudder)

[8] Proc. Acad. Nat. Sci. Phila., 1916, pp. 135-146 (1916).

Pronotal profile as a whole arcuate throughout, or arcuate with a median flattening or subconcavity, in general sublamellate (suggesting the genus *Nomotettix*); lateral lobes of pronotum with caudal margin having the usual tegminal sinus subobsolete or at most a mere shallow concavity; scapular area of pronotum deep proximad. Tegmina small, usually in part or entirely concealed under the pronotum 2



Figs. 1 to 8. *Neotettix proavus*: fig. 1 (upper left), head, frontal aspect, ♀, paratype, Atlanta, Georgia; fig. 2 (upper center), head, left lateral aspect, ♀, paratype, Atlanta, Georgia; figs. 3 and 4 (upper right), caudal outline, pronotal lobes, left lateral aspect, ♀♀, Clarksville, Tennessee; fig. 5 (left center), scapular area of pronotum, left lateral aspect, ♀, Clarksville, Tennessee. *Neotettix nullisinus*: fig. 6 (lower left), scapular area of pronotum, left lateral aspect, ♀, Brownsville, Texas; fig. 7 (lower center), head, left lateral aspect, ♀, Brownsville, Texas; fig. 8 (lower right), head, frontal aspect, ♀, Brownsville, Texas.

2. Scutellar section of frontal costa of head proportionately broader, its lateral borders more strongly diverging ventrad to between the antennal bases. Crest of pronotum rather high and more evenly arcuate; cephalic margin of pronotal disk obtuse-angulate, reaching over head farther than in alternate category; scapular area of pro-

Figs. 9 to 16. *Neotettix femoratus*: fig. 9 (upper left), head, frontal aspect, ♀, Cape May, New Jersey; fig. 10 (upper center), apex of pronotum, dorsal aspect, ♀, Cape May, New Jersey; fig. 11 (upper right), head, frontal aspect, ♀, Pinellas Co., Florida [ecotype "bolteri"]; fig. 12 (left center), head, left lateral aspect, ♀, Cape May, New Jersey; fig. 13 (lower center), apex of pronotum, dorsal aspect, ♀ Pinellas Co., Florida [ecotype "bolteri"]; fig. 14 (right center), head, left lateral aspect, ♀ Pinellas Co., Florida [ecotype "bolteri"]; fig. 15 (lower left), head, dorsal aspect, ♀, Cape May, New Jersey; fig. 16 (lower right), head, dorsal aspect, ♀, Pinellas Co., Florida [ecotype "bolteri"].

notum regularly and evenly narrowing caudad. Median femora of both sexes proportionately longer and more slender. (Southeastern States.) .....*proavus* Rehn and Hebard

Scutellar section of frontal costa of head proportionately narrower, its lateral borders less strongly diverging ventrad to between the antennal bases. Crest of pronotum moderately low, its outline somewhat flattened or subconcave mesad; cephalic margin of pronotal disk subtruncate, not reaching far over head; scapular area of pronotum with proximal half subequal in depth, narrowing rather sharply in distal section. Median femora of both sexes proportionately shorter and broader. (Coastal Texas.) .....*nullisinus* (Hancock)

Pronotal dimorphism.—The occurrence of the two pronotal conditions commonly found in the Tetriginae is well illustrated in the genus *Neotettix*. The short pronotum, or brachypronotal condition, is the dominant tendency being found in 66% of the specimens of *N. femoratus*, 98% of *N. proavus* and in all known specimens of *N. nullisinus*. Of the 108 specimens of *N. proavus* studied by us only two are macropronotal, these coming from Clarksville, Tennessee. *N. femoratus* exhibits a higher brachypronotal rate in the southern part of its range with one exception (Mississippi series noted below). The small series from Pennsylvania, New Jersey, Delaware and Maryland are all brachypronotal, but in view of the size of the series (42 specimens) this cannot be taken as significant. The following brachypronotal rates are recorded: Virginia, 64%; North Carolina, 77%; South Carolina, 92%; Georgia, 71%; Florida, 76%; Alabama, 89%; Mississippi, 50%; Louisiana, 93%; Texas, 80%; Oklahoma, 70%. The series from Tennessee shows the very low brachypronotal rate of 46% (based on 122 specimens) and the Mississippi rate is also low being only 50% (based on 46 specimens). The bulk of the Tennessee series is from mountain areas of generally higher elevations than those inhabited by the species elsewhere. This indicates a correlation between altitudinal distribution, the montane environment and the brachypronotal condition. The Mississippi series, on the other hand, is apparently from lower areas and its low brachypronotal rate is therefore not correlated with higher altitudes. There is no correlation between the brachypronotal condition and sex since it is shared equally by males and females.

Morphological variation.—The species of *Neotettix* exhibit marked variation in several characters within their respective ranges. This is especially true of *N. femoratus*, the extreme

variants of which have supplied incentive to several nomenclators. In the following paragraphs, features of variation will be discussed under each of the species.

Neotettix femoratus shows such wide diversity in several characters that lack of adequate study series would surely lead to unnecessary name assignment. The characters we have analyzed for variation are: profile of the fastigio-facial angle, breadth of the vertex from above, degree of protrusion of the frontal costa in profile, form of the lateral carinae of the frontal costa in frontal aspect, pronotal surface, shape of the pronotal apex, shape and extent of the pronotal scapular area and depression of the posthumeral, atrovelutinous pronotal patches.

In lateral aspect, the outline and degree of protrusion beyond the eyes of the fastigio-facial angle is a highly variable character. In the usually encountered condition, the fastigio-facial outline is approximately rectangulate-rounded (see fig. 12) and extends before the eyes a distance equal to slightly more than one-third the lateral width of one of them. The variant which least resembles this situation possesses a fastigio-facial angle which, in outline, is slightly obtuse and whose frontal costa in its upper third barely exceeds the anterior border of the eyes. Associated with this second condition is a slight increase in eye size and a lowering of the dorsal surface of the vertex so that it exceeds the dorsal surface of the eyes only slightly. The ecotypic form of this species formerly known as " bolteri " typically possesses this second fastigio-facial condition with its correlated characters. However, this is not always the case and the two conditions frequently grade from one to the other in a single population. The second condition is most often encountered in the southern part of the species' range.

Another feature of variation is the width of the vertex which varies quite widely (see table 2). The specimens possessing the wider vertices are nearly always of the ecotype " bolteri," but as in the preceding condition this is not necessarily so and both forms of the species vary in this character.

The final character of the head considered by us is the form of the frontal costa as seen in frontal aspect. Attention has been called to this character and it has been rather fully discussed by

Rehn and Hebard[9] whose general conclusions are supported by this study. The exact form of the lateral carinae of the frontal costa varies from "flask" shape to an even, though wide, divergence. These extremes are not associated with either ecotype or with geographic placement and appear to vary independently within most of the populations analyzed by us. Two extremes of this condition are figured (figs. 9, 11).

The pronotal surface varies from a smooth, evenly and finely granulose condition to one which is very rough with prominent rugulae and strumae and often weakly scabrous. The very rough pronotal surfaces are exclusively possessed by the "bolteri" ecotype. No specimen of this form is known to us which has a smooth surface, but many otherwise typical *femoratus* specimens possess rougher, tuberculate and lightly rugulose pronotal surfaces. This is especially true in the southern part of the species' range.

The apex of the pronotum varies in form from an acute and sharp termination to one which is blunter and much broader (figs. 10, 13). This latter condition is associated with most specimens of the "bolteri" ecotype and is unknown in the typical form of *femoratus*.

The scapular area of the pronotum varies in the proportion of its length (antero-posterior) to its depth (dorso-ventrad) throughout its length. Both extremes (typical *femoratus* and "bolteri" ecotype) have the length of the scapular area about 10 times greater than its depth, but the depth at various points along its length varies in the two so that the overall form of the structure is markedly different. The ecotype "bolteri" most frequently possesses the type of scapular area which is deeper over the greater part of its length. The condition is not restricted to this form and varies widely in all populations studied.

In nearly all specimens of the ecotype "bolteri," the atrovelutinous, posthumeral patches of the pronotum are depressed well below its surface. This feature varies in all of the populations analyzed, but no specimen of typical *femoratus* has these patches so deeply depressed as is found in the extreme variant. The normal condition is one in which these patches are moderately

[9] Proc. Acad. Nat. Sci. Phila., 1916, p. 142 (1916).

and evenly depressed beneath the overall surface of the pronotum.

Neotettix proavus is less variable in its morphology than *N. femoratus,* showing appreciable variation in the degree of development of the tegminal sinuses, extent to which the tegmina are exposed, degree of cristation of the median pronotal carina and surface condition of the pronotum.

The tegminal sinuses of the pronotum in *proavus* are usually very weakly developed. In some specimens (♂, Crestmont, North Carolina, ♀♀, Clarksville, Tennessee, ♀, River Junction, Florida) they are virtually absent whereas in others (♂, ♀, Clarksville, Tennessee, ♀, Decatur Co., Georgia) they are moderately to strongly developed. The most pronounced development of these structures was observed in the two macropronotal specimens (both females) from Clarksville, Tennessee (see figs. 3, 4 for comparison of both extremes). The degree to which the tegmina are exposed is apparently not correlated with the development of the tegminal sinuses except in the case of the two macropronotal females cited above. The usual condition is for the tegmina to be completely cryptic. This varies, however, to a condition in which the tegmina are fully exposed (macropronotal ♀♀, Clarksville, Tennessee). An analysis of this condition is given in the following table (table 3). It is evident, by reference to this table, that partly exposed tegmina, when this condition occurs, are found more often in females than in males. It is most apparent in the Clarksville, Tennessee series where 63% of the specimens have partly or fully exposed tegmina.

The median pronotal carina in *proavus* is always sharply cristate and the pronotum, in cross section, is sublamellate in its dorsal region. Slight variation occurs in the height of this carina and its degree of cristation, but this is not correlated with geography or sex.

The usual surface condition of the pronotum in *proavus* is moderately rough with scattered tubercles of various sizes. A few specimens have the pronotal surface somewhat smoother with almost no tuberculation.

The small series of *Neotettix nullisinus* exhibits almost no appreciable variation in its external morphology. Slight differences are noted in the surface condition of the pronotum which is usu-

	Length of body	Length of pronotum	Breadth of fastigium	Length of fastigium cephalad of eyes	Length of caudal femur
	8.4	8.0	.95	.12	5.3
	7.7	7.4	.87	.10	5.1
	7.8	7.6	.87	.10	5.0
♂	7.6	7.3	.88	.15	5.0
	7.5	7.0	.82	.07	5.0
	7.5	7.3	.87	.15	4.9
	7.6	7.5	.87	.08	4.9
	7.8	7.0	.88	.13	4.8
	9.5	8.8	1.06	.13	6.0
	9.7	8.4	1.03	.17	5.6
	9.9	8.5	1.05	.17	5.7
♀	10.1	8.2	1.02	.13	5.4
	9.4	8.4	.98	.12	5.5
	8.7	8.5	1.00	.13	5.6
	9.5	8.4	.97	.15	5.4
	9.5	10.9	.95	.15	5.8

Table 1. Size variation in five morphological characters of *Neotettix proavus* from Clarksville, Tennessee. All measurements are in mm.

ally rough, coarsely granulose, with a few large scattered tubercles. One of the specimens (a male) from Brownsville, Texas, has the dorsal pronotal surface somewhat smoother and with smaller tubercles.

Coloration, pattern and tone.—The remarks made by Rehn and Hebard [10] concerning the coloration of this genus are fully supported by the present analysis and the student is referred to them. As noted there, the distinctive feature of coloration which sets this genus apart from other North American tetrigines is the high percentage of individuals which are of a brown-cinereous color. Many chromatomorphs, beside those reported by Rehn and Hebard, are apparent in *Neotettix femoratus*. The most conspicuous of these are specimens in which the distal (apical) half of the pronotum is of a light cream color. Others have the entire pronotum cream to buffy color, while a few are ashy-gray in this area. There appears to be no regional or sexual correlation with regard to these chromatomorphs.

Neotettix proavus and *Neotettix nullisinus* are decidedly more conservative in their coloration than is *Neotettix femoratus*.

[10] Proc. Acad. Nat. Sci. Phila., 1916, pp. 140, 143, 145 (1916).

	Ocean View* and Dias Creek, New Jersey				Shreveport, Louisiana				Fort Myers, Florida				Auburndale, Florida (ecotype "bolteri")			
	♂		♀		♂		♀		♂		♀		♂		♀	
Length of body	7.3*	7.4	9.7*	8.5	7.2	6.9	8.2	8.4	7.0	7.5	7.6	8.0	7.4	7.3	8.2	8.5
	7.1*		10.5*	10.0	7.5	7.1	8.6	8.4	6.7	6.1	8.5	7.6	7.5	7.6	8.7	8.8
	7.5*		9.3*	8.1	7.2	7.5	8.2	7.1	7.3	6.4	8.1	8.0	7.5	6.9	9.0	8.9
	7.2		9.6*	8.5	7.4	7.2	8.5		7.2	7.6	7.6	7.6	7.4	7.7	8.5	9.4
Length of pronotum	6.7*	6.9	7.9*	7.4	6.8	6.5	7.6	7.4	6.3	7.1	7.0	7.7	6.6	6.3	6.9	7.8
	6.6*		7.5*	8.2	7.2	7.0	7.5	7.2	6.0	6.4	7.4	7.1	6.8	6.4	7.2	7.6
	6.8*		7.8*	7.7	6.7	6.6	7.2	7.4	6.1	6.5	7.1	7.5	6.1	6.5	7.1	7.5
	6.8		7.5*	8.0	6.6	6.5	7.3		7.1	6.9	6.9	7.0	6.5	6.4	7.4	7.7
Breadth of fastigium	.65*	.70	.70*	.73	.65	.61	.78	.70	.62	.60	.72	.72	.67	.65	.77	.77
	.67*		.69*	.68	.67	.68	.73	.68	.58	.60	.70	.72	.68	.67	.82	.75
	.70*		.63*	.75	.62	.67	.70	.78	.62	.62	.72	.68	.70	.68	.82	.77
	.63		.74*	.80	.58	.62	.75		.65	.67	.67	.67	.67	.67	.73	.80
Length of caudal femur	4.8*	4.8	5.6*	5.7	4.5	4.8	5.6	5.6	4.7	5.0	5.2	5.2	4.8	4.6	5.0	5.3
	4.6*		5.4*	5.7	5.0	4.9	5.5	5.5	4.3	4.5	5.3	5.5	5.1	4.9	5.4	5.3
	4.8*		5.7*	5.2	4.4	4.8	5.7	5.8	4.8	4.6	5.3	5.5	4.8	4.6	5.5	5.2
	4.9		5.6*	5.5	4.7	4.8	5.4	4.8	5.0	5.1	5.0	5.2	4.9	5.0	5.3	5.6

Table 2. Size variation in four populations of *Neotettix femoratus*. All measurements are in mm.

Location	Tegmina cryptic		Tegmina partly exposed		Tegmina fully exposed	
	♂	♀	♂	♀	♂	♀
Kentucky						
3 mi. S. of Wasioto	1					
Tennessee						
Hartford	1					
Allardt	4	4		2		
Grassy Cove	2	2	1			
Black Mt.		1				
Clarksville	17	8	4	13		2
North Carolina						
Crestmont						
South Carolina						
Clemson College				1		
no exact locality	1					
Georgia						
Sand Mt.	2			1		
Jasper	1					
Raven Rock Mt.				1		
Mountain City		2		1		
Atlanta				1		
Macon	1			1 (type)		
Holten	1					
Decatur Co.	2	2				
Alabama						
Greenville	1					
Salt Mt.	1					
Florida						
River Junction	1	2				
6 mi. E. Mosquito Creek	1	1				
Camp Torreya	1			2		
Gainesville		1				
Monticello	1	1				
Liberty Co.				1		

Table 3. Analysis of tegminal condition in adults of *Neotettix proavus*.

Variation is noted in general coloration which is usually dull brown or gray-brown to light, cinereous-brown, which is frequently seen. Only four of the 108 specimens of *proavus* seen by us lack the velvety-black, posthumeral patches on the pronotum, although these are frequently absent in *femoratus*. All of the specimens of *nullisinus* possess these patches.

Size variation.—The variation in size of various morphological characters for the three species of this genus are shown in tables

		Brownsville Texas	Webster Texas	Houston Texas
Length of body	Type ♀	9.7		
	♀	10.0	10.2	9.6
	♀	9.5		
	♂	7.4	7.4 7.5 7.3	7.1
Length of pronotum	Type ♀	7.8		
	♀	9.1	9.0	9.0
	♀	8.2		
	♂	7.1	7.1 7.0 7.1	7.2
Breadth of fastigium	Type ♀	.94		
	♀	.94	1.0	.94
	♀	.89		
	♂	.79	.84 .79 .84	.84
Length of fastigium	Type ♀	.10		
	♀	.10	.15	.13
	♀	.87		
cephalad of eyes	♂	.10	.10 .13 .10	.15
Length of caudal	Type ♀	5.2		
	♀	---	5.6	5.7
	♀	5.3		
femur	♂	4.7	4.7 4.6 4.8	4.7

Table 4. Size variation in five morphological characters of *Neotettix nullisinus*. All measurements are in mm.

1, 2 and 3. Table 2, gives this data for populations of *N. femoratus* from five localities. Table 1 lists size variation for *N. proavus* from Clarksville, Tennessee and table 4 records the same for *N. nullisinus* for the entire series studied by us.

Neotettix femoratus (Scudder)

Tettix femoratus Scudder, Proc. Entom. Soc. Phila., II, p. 306 (1869) [♀; Maryland].

N[*eotettix*] *rotundafrons* Hancock,[11] Entom. News, IX, p. 139, pl. VIII, figs. 3, 3a-d (1898) [♀; Jacksonville, Florida].

N[*eotettix*] *bolivari* Hancock, Entom. News, IX, p. 139, pl. VIII, figs. 2, 2a-d (1898), [♀, ♂; Opelousas, Louisiana; Tifton, Georgia; North Carolina].

N[*eotettix*] *bolteri* Hancock, Entom. News, IX, p. 139, pl. VIII, figs. 1, 1a-e (1898), [♀, Jacksonville, Florida].

Neotettix bolivari var. *longipennis* Hancock, Tettig. No. Amer., p. 165 (1902), [♂; Columbus, Texas].

Neotettix coarctatus Hancock, Tettig, N. Amer., p. 165. [♀; "New Mexico" [= Dade Co., Florida] [12]; Cocoanut Grove Florida].

Neotettix variabilis Hancock, Tettig. No. Amer., p. 165 (1902), [♀; Cocoanut Grove, Florida].

Neotettix hancocki Blatchley, Orth. of Indiana, p. 226 (1903), [♀; Knox Co., Indiana].

Apotettix minutus Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1905, p. 34, pl. 1, figs. 3 and 4 (1905), [♂; Miami, Florida].

The synonymy of *rotundafrons* was established and that of *bolivari* suggested by Morse,[13] a course supported as a probability by Rehn and Hebard in 1911,[14] and conclusively established by the latter authors in 1916.[15] At the same time they also placed *N. bolivari longipennis* and *N. variabilis* as synonyms of *N. femoratus,* and on a subsequent page [16] they regarded *N. hancocki* and *coarctatus* and *Apotettix minutus* as synonymous under *N. bolteri,* which latter they then considered a valid species. In the course of the present study we have found beyond question that Hancock's *bolteri* cannot be maintained as a distinct specific entity, which problem is discussed on a following page.

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[11] This specific name was emended to *rotundifrons* by Scudder in 1900 (Proc. Davenp. Acad. of Sci., VIII, p. 16).

[12] The error in the labelling of this specimen was pointed out by Rehn and Hebard in 1912 (Proc. Acad. Nat. Sci. Phila., 1912, p. 245 footnote). The United States National Museum accession number shows it was taken in Dade Co., Florida.

[13] Publ. Carneg. Inst. Wash. no. 18, p. 25 (1904).

[14] Proc. Acad. Nat. Sci. Phila., 1910, p. 623.

[15] Proc. Acad. Nat. Sci. Phila., 1916, p. 141 (1916).

[16] Proc. Acad. Nat. Sci. Phila., 1916, p. 144 (1916).

Designated types, or lectotypes here selected, on which the above listed names were based are as follows:

Tettix femoratus Scudder. The unique type (♀) was deposited by the American Entomological Society with the Academy of Natural Sciences of Philadelphia, in the type record of which it is #5185. It is in perfect condition except for the loss of the antennae.

Neotettix rotundafrons Hancock. Based on two females, one in the Bolter Collection at the University of Illinois, the other in the Hancock Collection. The latter specimen is here selected as the lectotype, and is type no. H634 in the Academy of Natural Sciences of Philadelphia series. It is labelled "Neotettix rotundafrons" in Hancock's long-hand on a printed "Hancock's type 1898" label. The locality label is "Jacksonville, Florida." Except for the loss of the antennae and the right cephalic tarsus it is undamaged, although the left cephalic limb was lost in life and is represented by a regenerated femoral stub.

Neotettix bolivari Hancock. Originally based on a series of "seventeen specimens in [the] author's collection." Lectotype here selected: ♀, Type no. H635 Academy of Natural Sciences of Philadelphia, Opelousas, La., April 19, 1897, labelled "Neotettix bolivari" in Hancock's long-hand on a printed "Hancock's Type, 1898" label. The specimen is complete except for the loss of parts of the antennae.

Neotettix bolteri Hancock. The unique type of this species was said by Hancock in 1902,[17] to be in the collection of the University of Illinois.

Neotettix bolivari variety *longipennis* Hancock. Based on an apparently unique male in the United States National Museum collection, taken by Riley at Columbus, Texas.

Neotettix coarctatus Hancock. Apparently based on two females in the collection of the United States National Museum, of which the female from Cocoanut Grove, Florida, taken by Riley, is here indicated as the lectotype.

Neotettix variabilis Hancock. Based on a female (apparently unique) in the United States National Museum series.

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[17] Tettig. N. Amer., p. 97.

Neotettix hancocki Blatchley. Based on a unique female from Knox Co., Indiana, in the Hancock series. This specimen, which has lost its antennae, its left median limb and the dorsal ovipositor valves, is Type no. H618, Academy of Natural Sciences of Philadelphia.

Apotettix minutus Rehn and Hebard. The unique type of this species, no. H10, Academy of Natural Sciences of Philadelphia, has lost the left antenna and the left median limb.

The present species exhibits to a striking degree the broad range in morphological variation which is evident in a relatively large number of species of tetrigids. The number of synonymic names listed above makes evident the difficulties authors have had in the past in endeavoring to interpret the variant tendencies exhibited by this species. Hancock first failed to appreciate what *femoratus* really was, as Scudder misled him by saying the type was non-existent,[18] the consequence of which was that he redescribed what might be called the norm of the species as *N. bolivari.* Hancock's *N. bolivari* variety *longipennis* was based on the macropronotal condition of the species, while his *rotundafrons* and *variabilis* were erected on mere shades of purely individual variation. Blatchley's *hancocki* and Hancock's *coarctatus* represent similarly variants of what Hancock called *bolteri*, of which *Apotettix minutus* was founded on the macropronotal male.

The most important point involved in forming a systematic understanding of this species is the status of Hancock's " bolteri." Typically in its extreme condition, i.e. short and rather robust form of brachypronotal type, with heavily strumose ridges or " bosses " on the dorsal surface of the pronotum, with the median carina of the pronotum coarser but often not sharply defined, and more strumose surface sculpture of the dorsal and external faces of the caudal femora, there is almost no difficulty in recognizing individuals which could be referred to " bolteri." However, in but relatively few cases does one find all the material from one locality, or even one limited population, referable to " bolteri." In the great majority of representatives we find a definite and marked grading, with most of the intermediate steps represented,

[18] Rehn and Hebard in 1911 (Proc. Acad. Nat. Sci. Phila., 1910, pp. 622-623) stated the type was in existence and that certain of Hancock's names were probably synonymous.

between typical *femoratus* and " bolteri " in populations which show " bolteri " tendencies.

We have studied 2518 specimens of *femoratus* covering virtually the entire range of the species, and representing 407 localities. Of these localities 120 show to a greater or lesser degree tendencies toward " bolteri." We evaluated these latter on the basis of degree of departure from typical *femoratus* and of approach to " bolteri," and also mapped their distribution as distinct from the localities represented only by typical *femoratus*, and we then reached certain definite conclusions regarding " bolteri."

It is clear that " bolteri " has a definite environmental tie-in both in its extreme condition and in the variant shades approaching it. Similarly it is not found in the upland or more elevated sections of the range of *femoratus*, and that except for one area it appears to be developed only within the Austroriparian and Sabalian Life Zones. The exception is in southern Illinois and Ohio and south and south-central Indiana. It is possible that this may be explained by the waterway system of the Mississippi having supplied an avenue for northward penetration. The background for this postulate is that " bolteri " in its many occurrences for which we have any observational notes, in such latitudes occurs only in exceedingly wet situations, in swamps, such as cypress, or on wet muck or in almost equally moist environments. In the same latitudes and to the eastward typical *femoratus* is an inhabitant of drier situations. Much information along these lines is here presented in the section on habitats.

As we move southward into southern Georgia and Mississippi, and over the state of Florida we find that while " bolteri " is there found in the same type of wet environment it frequents to the northward, it also apparently extends somewhat more broadly outside of the immediate environment it prefers elsewhere, indicating to us that this tendency probably is older in that territory than elsewhere, and it thus possesses a greater ability to adapt itself to conditions which are not necessarily optimum for it, judging from its respect for limitations at localities where it occurs to the northward. From the results of a full analysis of all the material before us, the extent and character of its various features, and the area represented by material possessing the

latter of the "bolteri" type in varying degrees, we find no alternative to regarding "bolteri" as an ecotypic condition of *femoratus*. The case is in no way parallel to what we find in *Tetrix ornata ornata* and *T. o. hancocki*,[19] as there is no area of any extent in which we find "bolteri" the exclusive representative of the *femoratus* stock, as we do with *T. o. hancocki*. While we believe the "bolteri" condition probably originated in the extreme southeast, the presence of it in parts of Illinois, Indiana and Ohio may point to it having been more widely spread at some time in the early part of the Recent when conditions were warmer, or more pluvial, and hence more broadly favorable to this variant stock than today.

Distribution.—In the southeastern United States *Neotettix femoratus* is a dominant and widely spread species, occurring at elevations reaching from sea-level to as high as 5500 feet on Roan Mountain, North Carolina.[20] Within its range it occurs broadly in the Carolinian, Austroriparian and Sabalian Life Zones, apparently locally intrusive into the Alleghanian and Canadian Zones in the southern Appalachians. To the northward the limiting localities before us or in the literature are Staten Island, New York; Middlesex Co. (Jamesburg) New Jersey; Montgomery (Willow Grove) and Delaware (Pink Hill) Cos., Pennsylvania; Hocking Co., Ohio; Marion Co., Indiana; Washington Co. (Dubois), Illinois; Howell Co. (Olden), Missouri; Independence (3 ms. S. of Batesville) and Washington (Fayetteville) Cos., Arkansas; Pittsburg (McAlester) Co., Oklahoma, and Bowie (New Boston), Lamar (Paris) and Dallas (Dallas) Cos., Texas. Southward the species extends to the Florida Keys (Long, Big Pine and Key West), Florida and the Gulf Coast westward at least as far as the Galveston-Houston area of eastern Texas (Houston and Webster in Harris Co., and Dickinson in Galveston Co.).

The eastern coast from Staten Island southward forms the eastern periphery of the distribution, while to the westward the marginal records known to us are those already cited in southern

[19] See Rehn and Grant, Proc. Acad. Nat. Sci. Phila., CVIII, pp. 117-153 (1956).

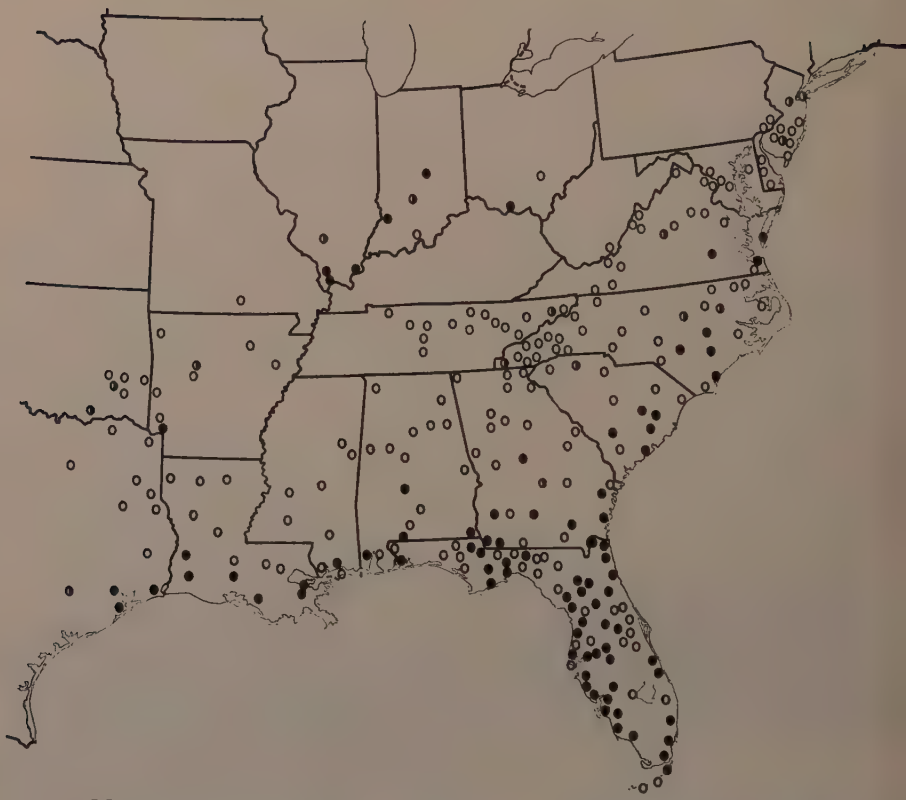
[20] Morse, Publ. 18, Carneg. Inst. Wash., p. 25 (1904).

Missouri (Olden) and northwestern Arkansas (Fayetteville), in southeastern Oklahoma, McAlester in Pittsburg Co., and Caddo in Bryant Co., and in Texas, Dallas (Dallas Co.) and Columbus (Colorado Co.). Osborn, in 1892,[21] reported "Tettix femoratus" as an Iowa species, but without citing any exact localities, although he stated that "the present notes refer almost entirely to the central part of the State, principally in the vicinity of Ames." We have seen no Iowa material of the species, and there have been no other recent records of it from that state, although much detailed field work has been done in it. Our feeling is that the species taken was misidentified at that time, and that *Tetrix arenosa angusta,* which species Osborn did not include in his state list although it is broadly distributed over Iowa, may have been intended.

Habitats.—The present species occurs in a broad range of habitats, which, however, are basically of two types, one made up of drier, often sandy or loamy situations, frequently under open hardwood or pine forests; the other including a broad range of wet swampy areas, often of exposed soft mucky ground, and usually along wet "branches," as they are called in the South, or even in cypress swamps or bordering salt marshes. The individuals occurring in the first-mentioned situations are generally typical *femoratus,* while on the other hand those from the wetter and more boggy environments do as a whole or in part, or in degree of differentiation approach the ecotype formerly known as *bolteri.* In Florida and adjacent parts of southern Georgia and Alabama the *bolteri* tendency is indicated to a degree in material which was taken in drier situations, but all the individuals which approach *bolteri* from the localities cited for Louisiana and eastern Texas were taken in the typical wet environment apparently favored by that ecotype, except that at Houston, Texas it was taken "in a dry stream bed through oak and pine groves," which, however, may have been much wetter a short time previously.

In the more northern part of its range the typical *femoratus* condition occurs in a broad variety of environments, these ranging from relatively dry fields and hill slopes to the borders of salt

[21] Proc. Iowa Acad. Sci., I, pt. 2, p. 116.



Map 1. Map showing the distribution of *Neotettix femoratus*. Open circles = *Neotettix femoratus* seen by the authors; half-filled circles = *Neotettix femoratus* records from the literature, but specimens not seen by the authors; filled circles = *Neotettix femoratus* ecotype (formerly known as *Neotettix bolteri*).

marshes, although the latter is unusual. At Pink Hill, Penna. it was found on the ground in open low cover of the steep slopes of a serpentine outcrop; at Dias Creek and Margate City, New Jersey, it was present at the edge of a swale of tall marsh grass, or in open salt marsh, while at Winslow Junction, New Jersey, it was found in a pine-barren boggy area among high *Panicum* and some *Juncus*. At Willow Grove, Delaware, it was taken in a sandy area, and between Sudlersville and Millington, Maryland (on the "Eastern Shore" peninsula) it occurred in tall

grass along a roadside ditch. Our field notes, as well as published information, show to the southward a very broad range of situations in which the species has been taken. It was found in open areas in long-leaf pine woods near Bolivia, North Carolina, at Pensacola, Florida, Springhill, Alabama, Hattiesburg, Mississippi and Breckenridge, Louisiana; on the ground beneath undergrowth of long-leaf pine woods at Bainbridge, Georgia, and River Junction, Florida; from pine or oak and pine woods on sandy soil, with undergrowth of oak scrub and saw palmetto at Ocala, Dunnellon, 9 ms. NE. of New Port Richey, Wall Springs, Indian Rocks and from near Floral City, Florida; in wire grass on sandy patches in long-leaf pine woods at De Funiak Springs, Florida; from a dry ditch in drained but still soft portion of original surface with tall grass and weedy growth, at the edge of coastal everglades, at Florida City, Florida; from short grass in meadows or in low rolling country at Evergreen and St. Elmo, Alabama, and Jackson and Brookhaven, Mississippi; in a sandy spot in opening in a tall hammock at De Leon Springs, Florida. It was taken in a marshy area with much grass on narrow sandy strand at Pass Christian, Mississippi; in pine woods on coquina with tall grass and saw palmetto undergrowth at Harvard, Florida; on ground in open mixed pine, oak and sweet gum woods with short grass ground cover and clumps of oak scrub at Forest, Mississippi or of oaks alone with much grass and patches of low oak scrub at 2 ms. N. of Laurinburg, North Carolina, and 3 ms. SE. of Monterey, Tennessee. It also was captured in low open deciduous forest with weedy undergrowth at 6 ms. E. of Fairoaks, Arkansas; in heavy deciduous forest at Vogel State Park, Georgia, and above Rocky Bottom, South Carolina, as well as in clayey or gravelly ground, which was in general bare, along the border of mixed woods with undisturbed ground cover at 3 ms. S. of Batesville, Arkansas, 5 ms. SE. of Tuscaloosa, Alabama, 3 ms. E. of Bolivar, Tennessee, and 1 m. W. of Tacoma, Virginia. In addition it was taken on dry ground about a " sink " at Woodville, Florida; in meadow flats with cover of medium height at Shreveport, Louisiana; along roadside in sand and grass near open pine woods at Sharpsburg, North Carolina and 12 ms. E. of Mathiston, Mississippi; in old fields or cut-over pine land at

Mobile ¾ m. SE. of Pearson and 1 m. W. of Reform, Alabama, 5 ms. N. of Blairsville, Georgia, and 5 ms. SW. of Galax, and near Canon, Virginia. Other habitat conditions given for typical *femoratus* are the sandy bed of stream at Doucette, Texas; along right-of-way of an abandoned railroad at 3.5 ms. SW. of Bryson City, North Carolina, and in a boggy spot with tall grass under scattered sweet gum flanked by pines and bordered by a blackberry tangle at Selbyville, Delaware.

The *bolteri* condition of the species, which as already noted is usually accompanied by individuals to a greater or lesser degree closing the apparent gap between the two ecotypes already discussed, presents a much less varied range of habitats. In nearly all cases material which may be regarded as in any way presenting the *bolteri* facies was taken either in very moist situations, or in flat lands or in ditches which would be subject to frequent or periodic surface saturation. The exceptions are all of Florida or southern Alabama localities, where individuals have been taken on the ground in pine woods, often long-leaf pine, and generally with saw palmetto ground cover, at Selma, Flomaton and Irvington, Alabama, Grand Ridge, Dunedin, between Oldsmar and Tampa, Plant City, Lakeland, Fort Myers, Iowa and 6 ms. N. of Murdock, Florida. It would seem that in the extreme southeastern section of the distribution of the species the *bolteri* condition spreads more widely over a variety of surface conditions than it does to the northward. Perhaps this may indicate a greater antiquity for the *bolteri* condition in that area. The general preference, however, for this condition is for definitely very moist situations, such as true swamps, " branches," sandhill ponds or marshy depressions. It was taken from drains along a road and railroad right-of-way at Birdsnest, Virginia, the most northern point in the East from which we have seen it, at Petersburg, Virginia, and Fayetteville, North Carolina, it was taken in marshy sink holes and among grasses in marshy spots, from a low spot with *Lycopodium* near Rose Hill, North Carolina, from damp sand in a ditch at 3 ms. SW. of Monck's Corner, South Carolina, and in a drain with shallow standing water from 5 ms. S. of Riceboro, Georgia. At Tallahassee, Florida it was found at the margin of a pond, swept from ground at the edge of a salt

marsh along a tidal creek near Tampa, Florida, from deep black muck at the land border of a salt marsh at Anona, Florida, and from ground surface of a coquina rock exposure—mere knobs above the general "glades" flood level—under a thin tree cover of slash pine and palmetto and lower growth of saw palmetto, sedges and tall grass at Ochopee, Florida, while at 3 ms. SE. of Naples, Florida it was swept in largely flooded slash pine woods with some scattered cypress and undergrowth mats of saw palmetto, with grasses and low shrubs. At Ship Island, Mississippi it was taken in marshy depressions in the sand dunes; in Louisiana at Harahan it was found infrequently on the mud border of the Mississippi River, at Rhoda in a swampy area about a mill-pond, in black swamp muck among cypress and grasses at Morgan City, at Lafayette along Vermilion Bayou, and at Le Bleu Settlement it was scarce in a wet area in long-leaf pine woods and adjacent coastal prairie. At Beaumont, Texas it was found on bare wet ground around a pool in pine woods, at Houston, Texas in a dry stream bed through oak and pine woods, and at Dickinson, Texas on wet ground near a stream in pine woods. Blatchley found this condition of the species in a cypress swamp in Knox County, Indiana, where in April "the whole swamp was then covered with water several feet in depth, and the young [all then present] were found in company with the young and adults of other tetrigids on the higher ground bordering the water, within ten feet of its margin and only a few rods from the nearest cypress trees." [22]

Seasonal Appearance.—It is reasonably evident that *N. femoratus* is single brooded in the more northern portion of its range, and at least two brooded in the broad sweep of its distribution in the South Atlantic and Gulf States, and that in at least some parts of its more southern range, and particularly Florida, it is probably present in the adult condition throughout the year. Adults and immature individuals are before us from 3 miles E. of Sarasota, Florida, taken January 3, and adults have also been reported by Blatchley taken January 9 at some one of four un-

[22] Orth. N. E. Amer., p. 173 (1920).

indicated Florida localities,[23] while Miami, Florida is represented by adult and juvenile material before us taken various dates in February (3 to 28), and both conditions taken February 20 at Dunedin in that state are also present. From Florida we have examined adults taken as late as December 9 at Gainesville, and similar material taken at many points in the state in late October and throughout November is also before us. Adults and immature individuals taken together have been examined from Florida localities representing every month of the year except May and December, and May is represented by immature specimens unaccompanied by adults. From Georgia the earliest date we have for adults is March 5 (Macon), with adults and immature individuals taken together at the same locality as early as April 26. Immature specimens alone have been seen from Cox, Georgia taken March 24. The latest exact capture date of adults we have for Georgia is October 5 (Leary), while adults and immature individuals were taken together on October 8 (Higgston), with similar Georgia representations distributed over September. The last date we have seen for immature specimens alone from Georgia are October 9 (Macon) and 16 (Tifton).

North of the Gulf States and Georgia the earliest dates available for adults and immature individuals are March 27 (Charlottesville, Va.), April 15 (Clarksville, Tenn.), 23 (Knox Co., Ind.), May 4-14 (4 ms. NE. of La Vergne, Tenn.), 15 (Sulphur Springs, N. C.) and 18 (Whitesbog, N. J.). Adults alone are before us taken April 12 (Olden, Missouri) and 23 (Tuskahoma, Okla.), May 5 (Wolf Lake, Ill.) and 23 (Cantwell, Ohio), June 14 (Falls Church, Va.) and 19 (Pink Hill, Pa.). Within the same broad area adults alone have been examined taken as late as November 12-14 (Morristown, Tenn.) and December 20 (Clarksville, Tenn.). Adults and accompanying immature individuals were taken October 8 at Atsion, N. J., and immature specimens alone as late as September 7 at Cape Henry and Virginia Beach, Va., and Sept. 9 at Tappahannock, Va.

[23] Orth. N. E. Amer., p. 172 (1920).

Localities represented.[24]

PENNSYLVANIA: *Pink Hill, Newtown Square (Delaware Co.). *Willow Grove (Montgomery Co.).

NEW JERSEY: *Gibbstown (Gloucester Co.). Taunton, Whitesbog, Mt. Misery and *Atsion (Burlington Co.). *Winslow Junction (Camden Co.). West Creek (Ocean Co.). *Margate City (Atlantic Co.). *Ocean View, *Dias Creek and Cape May (Cape May Co.).

DELAWARE: Florence, Willow Grove and Magnolia (Kent Co.). *Millsboro and Selbyville (Sussex Co.).

MARYLAND: *"Md." (*type*). Betw. Sudlersville and Millington, (Queen Anne Co.). *Plummer's Island (Montgomery Co.).

DISTRICT OF COLUMBIA: Washington.

VIRGINIA: Birdsnest (Northampton Co.). Alexandria (Alexandria Co.). Falls Church (Fairfax Co.). *Orange (Orange Co.). *Fredericksburg (Spotsylvania Co.). *Tappahannock (Essex Co.). *Cape Henry and *Virginia Beach (Princess Anne Co.). *Hickory (Norfolk Co.). *Petersburg (Dinwiddie Co.). *Charlottesville (Albermarle Co.). Cedar Creek (Frederick Co.). McDowell (Highlands Co.). Fossifern on Jackson River, *Bald Knob, 4245 ft., *Hot Springs, 2800 ft., Collison Ridge, 2700-3200 ft., and 2 ms. W. of Germantown (Bath Co.). Mountain Lake (Giles Co.). Blacksburg (Montgomery Co.). 1 m. W. of Tacoma, 2200 ft. (Wise Co.). Along New River, 5 ms. SW. of Galax, 2300 ft., (Grayson Co.). Nr. Canon, 6.5 ms. W. of Willis, 2750 ft. (Carroll Co.).

WEST VIRGINIA: Nr. Rock Camp, 1275 ft. (Monroe Co.).

NORTH CAROLINA: *Eure (Gates Co.). *Tunis (Hertford Co.). *Weldon (Halifax Co.). Tyrell Co. Sharpsburg (Nash Co.). *Greensboro (Guilford Co.). *Salisbury (Rowan Co.). *Charlotte (Mecklenburg Co.). *Raleigh and Newhill (Wake Co.). Southern Pines (Moore Co.). *Goldsboro (Wayne Co.). Nr. Rose Hill (Duplin Co.). *New Bern (Craven Co.). *Winter Park and *Wrightsville (New Hanover Co.). Bolivia (Brunswick Co.). *Fayetteville (Cumberland Co.). 2 ms. N. of Daurinburg (Scotland Co.). *Morganton (Burke Co.). Black Mountain, *Asheville and *Sulphur Springs (Buncombe Co.). *Hendersonville (Henderson Co.). *Saluda (Polk Co.). Doughton Park, Blue Ridge Parkway (Alleghany Co.). *Linville (Avery Co.). Crestmont, 1700, 3200, 4000 and 4200 ft. (Haywood Co.). 3-5 ms. SW. of Bryson City, 1500 ft. (Swain Co.). *Governor's Island, *Balsam and 3 ms. SW. and 6.9 ms. SSE. of Cashiers (Jackson Co.). Franklin, Highlands, 4 and 4.7 ms. N. of Highlands, Wrights' Farm, near Highlands, 1.5 ms. E. of Highlands, Cliffside Recreation area, Nantahala Nat. Forest, S. slope of Satulah Mtn. 2 ms. S. of Highlands, 3250-3300 ft. and "Horse Cove" (Macon Co.).

[24] As in previous studies of this character an asterisk before a locality means that the material on which the record is based has already been recorded in published literature.

South Carolina: 7 ms. S. of Myrtle Beach (Horry Co.). *Nr. end of Sullivan Island and *Ashley Junction (Charleston Co.). 3 ms. SW. of Monck's Corner (Berkeley Co.). *Yemassee (Hampton Co.). Florence (Florence Co.). *Manning (Clarendon Co.). Lane (Williamsburg Co.). Fort Lawn (Chester Co.). *Columbia (Richland Co.). *Denmark (Bamberg Co.). Above Rocky Bottom, 1800 ft. (Pickens Co.).

Georgia: *Sand Mountain (Dade Co.). Neel Gap, Vogel State Park and 5 ms. N. of Blairsville (Union Co.). *Rabun Bald (Rabun Co.). Dahlonega (Lumpkin Co.). *Toccoa (Stephens Co.). Marietta (Cobb Co.). *Vicinity of Stone Mountain (De Kalb Co.). 10 ms. N. of Atlanta, *Atlanta and Bolton (Fulton Co.). *Augusta (Richmond Co.). *West Point (Troup Co.). Louisville (Jefferson Co.). Prattsburg (Talbot Co.). *Macon (Bibb Co.). Higgston (Montgomery Co.). *Isle of Hope, *Tybee and *Tybee Island (Chatham Co.). 5 ms. S. of Riceboro (Liberty Co.). 10 ms. E. of Leary (Calhoun Co.). *Albany (Dougherty Co.). *Tifton (Tift Co.). *Waycross, *Hebardville and edge of Okeefenokee Swamp (Ware Co.). *St. Simon Island and *Brunswick (Glynn Co.). Sealey's Springs and Roy's Lake (Seminole Co.). Mosquito Creek on Georgia Highway 97, *Bainbridge and *Spring Creek (Decatur Co.). *Thomasville (Thomas Co.). *Homerville (Clinch Co.). *Billy's Island, Okeefenokee Swamp. Honey Island. Cox.

Florida: 2.6 ms. E. of State line on US 90, Pensacola, *Warrington and *Fort Barrancas (Escambia Co.). *De Funiak Springs (Walton Co.). Bonifay (Holmes Co.). Chipley (Washington Co.). *Marianna and Grand Ridge (Jackson Co.). Mount Pleasant and River Junction (Gadsden Co.). Woodville, *Tallahassee, Lake Jackson and Choires (Leon Co.). Aucilla and Waukeenah (Jefferson Co.). Lee and Greenville (Madison Co.). Amelia and Hilliard (Nassau Co.). *Jacksonville, *Atlantic Beach and *Pablo Beach (Duval Co.). Auburn (Bay Co.). Rock Bluff Landing and Camp Torreya (Liberty Co.). Liberty Co. Carrabelle and 2 ms. W. of Apalachicola (Franklin Co.). Wakulla Springs (Wakulla Co.). Perry (Taylor Co.). Suwannee Springs and *Live Oak (Suwannee Co.). *Saint Augustine and Anastasia Island (St. Johns Co.). Old Town (Dixie Co.). Newberry, 2.7 ms. N. of Newberry, Poe Springs, Newman's Lake, 6 ms. W. of Newman's Lake, Areedondo ½ m. N. of Paradise, 3 ms. W. of Paradise, Levy-Warburg Lake, Fairbanks, Waldo, *Gainesville, 1.8 m. E. of Gainesville, 6 ms. W. of Gainesville, Archer and Orange Heights (Alachua Co.). Alachua Co. Between Crescent City and Lake Como, 1.7 ms. NE. of Satsuma and Welaka (Putnam Co.). Yankeetown, 1.6 ms. W. of Wylly, Cedar Keys, Sumner, 5 ms. N. of Sumner, 10 ms. N. of Sumner, Wacasassee River and Lebanon Station (Levy Co.). Levy Co. Dunnellon, 4 ms. NW. of Dunnellon, Juniper Springs, Ocala National Forest and Ocala (Marion Co.). De Leon Springs and 1.5 ms. E. of Glenwood (Volusia Co.). Inverness and near Floral City (Citrus Co.). 2 ms. N. of Pittman, 7 ms. N. of Pittman, 1.5 ms. W. of Astor, 1 m. E. of Astor Park and 2 ms. W. of Tavares (Lake

Co.), Altemonte Springs and Sanford (Seminole Co.). 3.1 m. E. of Bayport (Hernando Co.). Pinecrest, *Fort Reed and Orlando (Orange Co.). Capron (Brevard Co.). 9 ms. NE. of New Port Richey nad Trilby (Pasco Co.). Wall Springs, Indian Rocks, Indian Beach, Sand Key, Anona and Dunedin (Pinellas Co.). Plant City, 2 ms. N. of Plant City, near Tampa, Hillsborough River State Park and between Oldsmar and Tampa (Hillsborough Co.). Loughman, *Lakeland, Auburndale and Lake Alfred (Polk Co.). Polk Co. N. of Olney and Kissimmee (Osceola Co.). Indian River Co. Manatee (Manatee Co.). Fort Pierce (St. Lucie Co.). Myakka River State Park, 3 ms. E. of Sarasota, 6 ms. E. of Sarasota, Sarasota Key, 6 ms. NW. of Murdock, Fruitville and Venice (Sarasota Co.). Arcadia (De Soto Co.). De Soto Co. Near Murdock, *Punta Gorda and Cleveland (Charlotte Co.). Palmdale (Glades Co.). Everglade, *La Belle, *Pineland, *Pine Island, *Fort Myers, Boca Grande, Bonita Springs and Iona (Lee Co.). Lee Co. 2.7 ms. W. of junction of Florida 7 and US 441 and Loxahatchee (Palm Beach Co.). Ochopee, 10 ms. NE. of the Everglades, Royal Palm State Park, 3 ms. SE. of Naples, 12 ms. S. of Naples and Marco (Collier Co.). 5.8 ms. N. of junction Florida 814 and US 441, Fort Lauderdale and Pompano (Broward Co.). *Key West, *Long Key and *Big Pine Key (Monroe Co.). *Miami, 25 ms. W. of Miami, Coral Gables, Florida City on eastern edge of coastal Everglades *(Detroit), Hialeah, Howard, Paradise Key and *Homestead (Dade Co.).

Ohio: Cantwell Salt Creek Twp., and Neotoma (Hocking Co.). Adams Co.

Indiana: Marion Co. *Crawford Co. *Knox Co.

Illinois: *Elizabethtown (Hardin Co.). *Wolf Lake (Union Co.). *Pulaski (Pulaski Co.).

Missouri: *Olden (Howell Co.).

Tennessee: Roan Mtn., 2600, 5800-6100 ft. and *Burbank (Carter Co.). Mt. Leconte, Great Smoky Nat. Park (Sevier Co.). *Morristown (Hamblen Co.). Knox Co. Coal Creek (Anderson Co.). Big South Fork of Cumberland River, 1200 ft. (Scott Co.). Allardt, 1600-1700 ft. (Fentress Co.). Grassy Cove, 1600-2600 ft., Crab Orchard and Clark Range (Cumberland Co.). 3 ms. SE. of Monterey, 1950 ft. (Putnam Co.). Lebanon State Park (Wilson Co.). Percy Warner Park in Nashville, 4 ms. E. of Donelson, Workman Property and 13 ms. SE. of Nashville (Davidson Co.). 3 ms. E. of Longview (Bedford Co.). "Cedar Glades" area, 4 ms. NE. of LaVergne (Rutherford Co.). *Clarksville (Montgomery Co.).

Alabama: *Anniston (Calhoun Co.). Branchville (St. Clair Co.). *McCalla (Jefferson Co.). Wilson Dam (Colbert Co.). 1 m. W. of Reform (Pickens Co.). ¾ m. SE. of Pearson (Bibb Co.). 5 ms. SE. of *Tuscaloosa (Tuscaloosa Co.). *Auburn (Lee Co.). Selma (Dallas Co.). *Greenville (Butler Co.). Dothan (Houston Co.). Evergreen (Conecuh Co.). *Flomaton (Escambia Co.). Mobile Bay (Baldwin Co.). Mobile, Springhill, Irvington and St. Elmo (Mobile).

MISSISSIPPI: 12 ms. E. of Mathiston (Oktibbaha Co.). Shuqualek (Noxubee Co.). Forest (Scott Co.). Jackson and Utica (Hinds Co.). Brookhaven (Lincoln Co.). *Hattiesburg (Forrest Co.). *Nugent, *Biloxi Ship Island off Biloxi, *Gulfport and Pass Christian (Harrison Co.). Bay St. Louis (Hancock Co.).

ARKANSAS: 3 ms. S. of Batesville (Independence Co.). 6 ms. E. of Fairoaks (Cross Co.). *Ola (Yell Co.). *Fayetteville (Washington Co.). Polk Co. *Rich Mountain Station and *Mena (Polk Co.). *De Queen (Sevier Co.). *Ashdown (Little River Co.).

LOUISIANA: Shreveport (Caddo Parish). Arcadia (Bienville Parish). West Monroe (Ouachita Parish). Natchitoches Parish. Alexandria (Rapides Parish). Beauregard Parish. *Opelousas (St. Landry Parish). Baton Rouge (East Baton Rouge Parish). Breckenridge (Livingston Parish). New Orleans (Orleans). Harahan (Jefferson Parish). Morgan City and Rhoda (St. Mary Parish). Lafayette (Lafayette Parish). Le Bleu Settlement (Calcasieu Parish).

OKLAHOMA: *Howe (Le Flore Co.). Tuskahoma (Pushmataha Co.). *Wilburton (Latimer Co.). *McAlester (Pittsburg Co.).

TEXAS: New Boston (Bowie Co.). Longview (Gregg Co.). De Berry (Panola Co.). Tenaha (Shelby Co). Paris (Lamar Co.). Dallas (Dallas Co.). Rush (Cherokee Co.). Doucette (Tyler Co.). Beaumont (Jefferson Co.). Houston and Webster (Harris Co.). Dickinson (Galveston Co.).

Neotettix proavus Rehn and Hebard

Neotettix proavus[25] Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1916, pp. 138, 139, pl. XII, figs. 1 and 2 (1916), [♀ (type), ♂; Macon, Bibb Co. (type locality), Buckhead and Jasper, Georgia; Murphy, North Carolina].

Cavotettix apterus Hancock, Entom. News, XXIX, p. 345, pl. XX, figs. 2-2c (1918), [♀ (type), ♂; Clarksville, Tennessee].

The synonymy of *Cavotettix apterus*, and hence of the genus *Cavotettix* under *Neotettix*, was established by Hebard in 1919.[26]

Of the type material on which the above listed names were based the type and all the original material on which *proavus* was established are now before us in the Academy series, except the Murphy, North Carolina paratype, which is in the Museum of Comparative Zoology. The type of the species, from Macon, Bibb Co., Georgia, is type no. H11. The type (♀) and allotype (♂) of *Cavotettix apterus* Hancock were in the Blatchley Collection, now the property of Purdue University.

[25] By lapsus this specific name appeared as "*proteus*" in Zoological Record, LIII, Insecta, p. 262 (1919).

[26] Entom. News, XXX, p. 79.

This neotenic species is of particular interest, inasmuch as it was the first of the type made known from North America, and also our knowledge of it is rather more comprehensive than that of most of the other neotenic tetrigids which are now known to occur in many parts of the world. In using the word neotenic here we are referring comparatively to members of genera most of the members of which possess what might be called the normal adult type of pronotum and the usual correlations of the same. Many tetrigid genera, particularly of tropical distribution, have pronota which could be called neotenic in degree of development, but these conditions are there generic and correlated with other evident differences.

Fox described and figured the relatively infrequent macropronotal condition of this species [27] from two females taken at Clarksville, Tennessee. One of these specimens is now before us in the Academy series. The same author noted that the macropronotal condition has a more evident indication of the tegminal sinus of the caudal margin of the lateral lobes of pronotum than is the case with the brachypronotal condition, which was the only one seen when the species was described. He also noted that the tegmina, usually hidden under the pronotum in the brachypronotal condition, are more evident in the macropronotal one. Hebard in 1919 [28] pointed out that an error was made in the original descriptions in regarding the male sex as lacking tegmina, and showed that that sex also possessed them, but that these were more generally non-evident than in the female.

It appears to us that *proavus* developed in the southeastern United States, probably in the Appalachian section or the Piedmont region, and that it has extended its range southward into southern Georgia and Alabama and northern Florida where conditions were to its liking. This extension may have been due to the peripheral effect of glacial conditions to the north. It is much more localized in its occurrence than is *N. femoratus*, and the highest elevation from which we have seen material is 3000 feet (Raven Rock Mountain, Rabun Co., Georgia), where it was taken by Rehn and Hebard in 1917.

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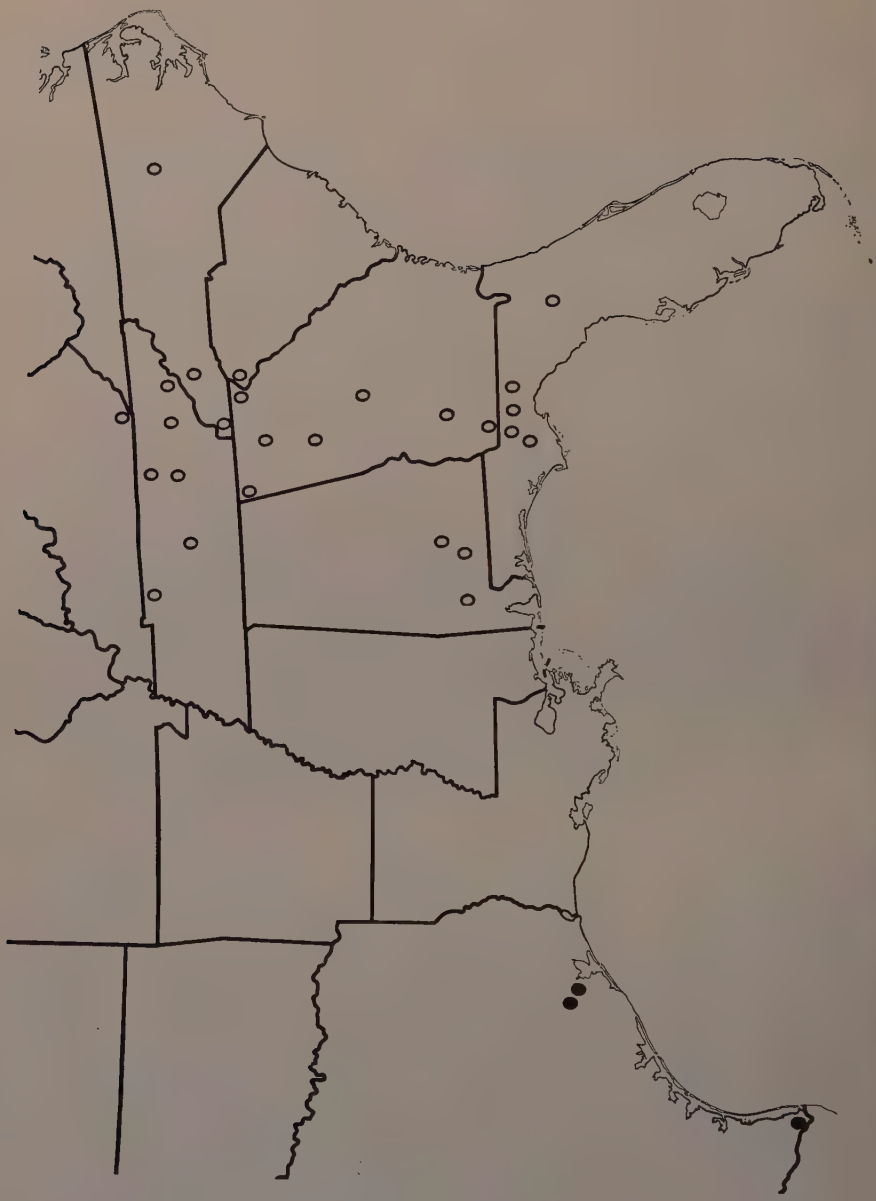
[27] Entom. News, XXIX, pp. 347-349, fig. (1918).

[28] Entom. News, XXX, p. 80, footnote 3.



Map 2. Map showing the distribution of *Neotettix proavus* and *Neotettix nullisinus*. Open circles = *Neotettix proavus*; filled circles = *Neotettix nullisinus*.

Distribution.—The sole record known to us from north of Tennessee and North Carolina is that from 3 ms. S. of Wasioto, Bell Co., Kentucky. From Tennessee a number of localities are in the literature or here cited, these reaching as far westward as Clarksville. The North Carolina localities known to us are Raleigh, Crestmont and Murphy. A single record is known from the mountain section of South Carolina. In Georgia the known localities extend from the northeastern (several localities in Rabun Co.) and northwestern (Sand Mountain) corners of the state to the southwestern section (Decatur Co.), while from Alabama it is known from several localities in upland areas of the southern section of the state. From Florida we know it only from the northern portion east of the Apalachicola River, and south as far as Alachua County. The species probably occurs in the higher parts of northern Alabama and probably will be found in southwestern Virginia. It apparently is absent from the whole coastal plain region of the South Atlantic States.

Seasonal Appearance.—Adults of this species are before us taken as early in the year as May 27 at Clarksville, Tennessee, and May 29 at "Camp Torreya," Liberty Co., Florida. Dates for adult material extending to July 24 for Clarksville are before us. A broad range of localities are represented by adults taken in July and August, while the last date on adult material is September 4 (Raven Rock Mountain, Rabun Co., Georgia). Immature material before us was taken as early as April 20 (3 ms. W. Paradise, Alachua Co., Florida), at Clarksville, Tennessee on May 8 and at "Cedar Glades" near LaVergne, Tennessee, May 4. August 1 is represented by adult material from Albany, Georgia, and adult and immature material from Evergreen, Alabama was taken on August 4, but no date subsequent to that is represented by immature material until December 1 at Macon, which is represented by very small nymphs. Apparently, from the information now available, the species is single brooded and over-winters in the immature condition.

Habitats.—It is clear that *N. proavus* is a sylvan species, and generally an inhabitant of deciduous forest areas. Marcovitch [29]

[29] Bull. 33 (vol. IX, no. 2) Tenn. State Board of Entom., p. 38 (1920).

referred to it in Tennessee as "limited to sylvan surroundings occurring on sunlit areas covered with leaf mold or mosses and often associated with *Spharagemon bolli* and *Melanoplus decoratus*." Hubbell, in 1925, stated apropos of its occurrence in northern Florida [30] that it was taken in Leon and Liberty Counties "in heavy ravine forests composed largely of beech and magnolia," while at Gainesville it was found "in rich hammock of water oaks, live oaks, sweet gum, red bay and many other trees." When the species was described the authors stated that the *proavus* they had personally collected were all taken "on the ground in woodland, composed of short-leaf pine (Macon), mixed pine and oak (Jasper) or oak alone (Buckhead)," also that "at Macon the species occurred among pine needles and at Buckhead it was on quite sandy soil." Hebard in 1919 added,[31] from field notes made by Rehn and Hebard, that at River Junction, Florida, it was found "in damp sandy area of ravine deciduous forest among very scant herbage," and at Greenville, Alabama, it was taken "in leaf litter on almost bare ground of heavy forest of magnolia, gum and some holly and tulip trees."

Blatchley in 1920 [32] quotes Fox (in litt.) relative to *N. proavus*, to the effect that he had taken it, at Clarksville, Tennessee "in May and June in more or less open sun-lit areas on mossy, grassy or leaf-covered ground in upland or hillside woods, occurring in much the same type of surroundings as *Spharagemon bolli*, *Melanoplus scudderi* and *Melanoplus luridus*. It is decidedly local or sporadic in its occurrence." Rehn and Rehn took it at 3 miles south of Wasioto, Kentucky, "in mixed deciduous forest of oak, hickory, maple, beech, magnolia, tulip, sweet gum, etc., where the undergrowth was chiefly similax."

Localities represented:

North Carolina: *Crestmont, 1800 ft. (Haywood Co.).
South Carolina: Clemson College (Oconee Co.).
Kentucky: 3 ms. S. of Wasioto (Bell Co.).
Tennessee: Hartford (Cook Co.). Knoxville (Knox Co.). Allardt and

[30] Florida Entomologist, IX, no. 3, p. 42.
[31] Entom. News, XXX, p. 81.
[32] Orth. N. E. Amer., p. 175.

Clear Creek (Fentress Co.). Grassy Cove, 1600-2000 ft., and Black Mountain (Cumberland Co.). "Cedar Glades" area 4 ms. NE. of LaVergne (Rutherford Co.). *Clarksville (Montgomery Co.).

GEORGIA: Sand Mountain, near Trenton (Dade Co.). *Jasper, 1550 ft. (Pickens Co.). Mountain City and Raven Rock Mtn., 3000 ft. (Rabun Co.). *Buckhead, Atlanta (Fulton Co.). *Macon (Bibb Co.). Albany (Daugherty Co.). Ravine and bluffs, Dist. 21, Lot 423 (Decatur Co.).

ALABAMA: *Greenville (Butler Co.). *Evergreen (Conecuh Co.). Salt Mountain, 6 ms. S. of Jackson (Clarke Co.).

FLORIDA: *River Junction (Gadsden Co.). .6 m. E. of Mosquito Creek on U. S. Highway 90 (Gadsden Co.). *"Camp Torreya" (Twp. 2 N., R. 7 N) (Liberty Co.). *Tallahassee (Leon Co.). Monticello (Jefferson Co.). *Gainesville, 3 ms. W. of Paradise and San Felasco Hammock (Alachua Co.).

Neotettix nullisinus (Hancock)

Cavotettix nullisinus Hancock, Entom. News, XXIX, pp. 344, 346, pl. XX, figs. 1-1a (1919), [♀; Brownsville, Texas].

This interesting and little-known species was described from a single specimen taken at Brownsville, Texas, by the late C. H. T. Townsend, and in Dr. Hancock's collection, which now is the property of the Academy of Natural Sciences of Philadelphia, where it is type no. H617. This specimen is in perfect condition except for the loss of the right antenna and the distal article of the left caudal tarsus. Hebard in 1919 [33] added to our knowledge records of material of the species taken at Houston and Webster, Harris County, Texas, based on four males and two females. In addition we have before us two males and one female of the species taken at Esperanza Ranch, Brownsville, Texas, in May (no date) and on August 18, doubtless collected by Mr. Charles Schaeffer when there in 1903 and 1904, the pair taken in May now belonging to the United States National Museum, the August 18 female to the Academy.

The species *nullisinus* is a close relative of *proavus*, but the two species can readily be separated by the features given in the preceding key to the forms of *Neotettix*.

There can be little question but that *nullisinus* and *proavus* have developed from a single basic stock, but all available information is too meager to attempt any further suggestion regarding the matter.

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[33] Entom. News, XXX, p. 82.

In distribution the species is known only from coastal Texas, and there only from well-separated areas, i.e. the Brownsville area, and the Houston district.

We have no information at all regarding the habitat in which the Brownsville material was taken. We do know that, as Hebard has shown,[33] the species was taken at Houston, Texas "on ground covered with short grass under scattered oaks" where it was very scarce, while our notes made at Webster, Texas, show that at that locality it was a little more numerous in coastal prairie country.

We know nothing regarding the immature stages of the species, and as for its seasonal appearance know only that it has been taken in May and as late as August 18 in the Brownsville district, and in July (19 at Webster) and August (12 at Houston) in the Houston area. It would thus seem to have a range over probably five months in the adult condition, although this may not apply in a single area.

Localities represented:

TEXAS: *Houston and *Webster (Harris Co.). *Brownsville (Cameron Co.). Esperanza Ranch, Brownsville (Cameron Co.).

INDEX TO THE GENERA AND SPECIES

New Genera and Species are Indicated by Bold Face Numerals

Adelphe, 208
Alieniscus, 201
alticola, Colocar, **196**
Alysson, 41
Amisega, 162
angusta, Tetrix, 121
antennata, Puiggaria, 86
appendiculata, Xiphidiopsis, 13
arenosa, Tetrix, 120
arnoldi, Alieniscus, 202
asperatus, Gorytes, 44
Atopogyne, **184**
azurea, Rohweria, **190**

baeri, Cuterebra, 21
bassleri, Gedoelstia, 18
Batrachidea, 68
belfragei, Bembix, 61
Bembecinus, 47
Bembix, 56
beutenmulleri, Bembix, 58
Bicyrtes, 49
bimaculatus, Myrmecomimesis, 179
bipunctata, Ochleroptera, 47

calcitrans, Stomoxys, 23
canaliculatus, Gorytes, 43
canicularis, Fannia, 24
carolina, Stictia, 53
Cephenemyia, 17
cinerea, Bembix, 59
Cladobethylus, 192
Cobboldia, 19
Colocar, **195**
comata, Bembix, 59
cooperi, Amisega, **162**
Crypsiceracris, 109
Cuterebra, 21

daeckei, Nysson, 42
dampfi, Oedematocera, 22
Dermatobia, 20
Dermatoestris, 19
dimidiatus, Nysson, 43
domestica, Musca, 23
Duckeia, 167

elegans, Steniolia, 52
Eutettigidea, 91
Exopapua, **182**
Exova, 181

Fannia, 24
femoratus, Neotettix, 230
flavicollis, Myrmecomimesis, 180
flavonotata, Batrachidea, 77
fodiens, Bicyrtes, 50

Gasterophilus, 18
Gedoelstia, 18
glabra, Crypsiceracris, 109
Gorytes, 43
gracilis, Lophoscirtus, 89

hebardi, Xiphidiopsis, **6**
Hermetia, 26
hominis, Dermatobia, 20
howardi, Xiphidiopsis, **10**

illucens, Hermetia, 26
Indothrix, **198**
inermis, Batrachidea, 79
integra, Bembix, 62

kahlii, Mesitiopterus, 165

latifrons, Psammaecius, 45
lineata, Atopogyne, **186**
Eutettigidea, 91
longicornis, Indothrix, **199**

159
1PC

Lophoscirtus, 87
loxodontis, Cobboldia, 19

macella, Batrachidea, **80**
macropi, Oestrus, 21
melleus, Alysson, 41
mendosum, Rehnidium, **104**
Mesitiopterus, 164
metallica, Rohweria, 189
Microbembex, 55
minor, Rohweria, **191**
minuta, Neokiskia, 20
monodonta, Microbembex, 55
mucronata, Batrachidea, 70
Musca, 23
mutilloides, Alieniscus, **202**
Myrmecomimesis, 170

nebulosus, Psammaecius, 45
necopinum, Rehnidium, **105**
neglectus, Bembecinus, 47
Neokiskia, 20
Neotettix, 217
Nesogyne, **210**
nigricans, Myrmecomimesis, 178
nigripes, Steniolia, 53
nullisinus, Neotettix, 249
nupela, Exopapua, **183**
Nysson, 42

Obenbergerella, 205
Ochleroptera, 47
oculata, Bembix, 62
Oedemagena, 19
Oedematocera, 22
Oestrus, 21
olivacea, Bembix, 63
omeiensis, Xiphidiopsis, **12**
omnivagum, Rehnidium, **95**

Pantophthalmus, 24
paradoxa, Gedoelstia, 18
perexiguum, Rehnidium, **102**
planifrons, Gorytes, 45
Pollenia, 23
proavus, Neotettix, 244
pruinosa, Bembix, 57
Psammaecius, 45
Pseudiastata, 26
pseudococcivora, Pseudiastata, 26
Puiggaria, 84
pulla, Stictiella, 52
punctaticeps, Myrmecomimesis, 179

quadrifasciata, Bicyrtes, 49

rehni, Xiphidiopsis, **9**
Rehnidium, **92**
Reidia, **203**
rieki, Atopogyne, **187**
Rohweria, 188
rudis, Pollenia, 23

sayi, Bembix, 60
scalaris, Fannia, 24
serrata, Stictiella, 51
speciosus, Sphecius, 46
Sphecius, 46
spinolae, Bembix, 58
Steniolia, 52
stepsicerontis, Dermatoestris, 19
Stictia, 53
Stictiella, 51
Stomoxys, 23
sulphurea, Microbembex, 56
suzukii, Xiphidiopsis, 15

tabaninus, Pantophthalmus, 24
taino, Nesogyne, **211**
tarandri, Oedemagena, 19
Tetrix, 120
texana, Bembix, 62
townsendi, Mesitiopterus, 166
tridens, Bembecinus, 48
troglodytes, Bembix, 61
tuberculata, Crypsiceracris, **112**
turneri, Reidia, **204**

ventralis, Bicyrtes, 50
verutum, Rehnidium, **100**
vesca, Batrachidea, **82**
vigil, Wohlfahrtia, 21

Wohlfahrtia, 21

Xiphidiopsis, 1